

COAL AGE

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No. 5

I remember a man who bossed a small mine; the hardest kind of mine to run, if you ask me. But it was a brand-new proposition and we are looking for such to try our skill on. Everywhere you wander, the cry is, "Wish I didn't have to grow fruit on old dead limbs."

So this foreman was favored, and thought a royal flush was in his hand. He pulled 150 tons per day in small cars out of that mine with one mule. Both he and the "super" wore an ever-happy smile and believed they were being vindicated.

Moreover, it didn't faze the mule—this boss wouldn't misuse any dumb animal, and the driver was as kind as a trained nurse, getting good service with a cheery "Git up." The animal seemed to feel it was a pleasure to pull for him, and clipped a few seconds off his "reaction time" which, in a mule, is long for the brain and surprisingly short in the heels.

The mine was a simple problem: coal averaging 400 ft. from daylight, and a gravity proposition to the tippie. That foreman got a cost of coal he could never attain again. He had made a record and was now in the 2:10 class where prizes are high, but victories come hard.

Oh! he was not without troubles. There was a dip lower than the level of his ditch, and a lot of water too, but he put in a pump run by steam from outside because it was cheaper than to build a new drain. You see, it was a temporary plan, but he figured that perhaps a deeper dip lay to the left.

Then the haul was getting harder, but it didn't seem well to blast rock for so small a tonnage. And there were a lot of leaking doors and brattices, but 95 per cent. of all the current was traveling right up to the faces, and most anyone can pick a hundred mines operated under 1911 standards by technical grads, circulating only 75 to 80 per cent. of the air.

And he could have put in overcasts, but the mine wasn't big enough—yet. Outside there wasn't much track-room, not for a good mine, but he could provide that when he would. The drift leaked and the approach

slopes were three to one instead of one to three, but it was summer and the banks didn't break with frost.

There was logic in it all, and, with delight, this foreman whittled that club, "cost of coal."

The tale is all told except to the dullard. That cost of coal didn't always remain so low, and the smiles left the foreman's face.

The dip got deeper, and then he couldn't get an appropriation to ditch it, although, of course, it was ditched later. Also, the grades had to be improved when the bulk of the coal came that way. He learned that his leaky stoppings were now putting only 50 per cent. of the air to the face, and a scant 25 tons was the output for a mule per day, since they had to "double" on the hills.

The mules' shoulders and flanks didn't any longer suggest trained nurses, and each animal divided its time between pulling the cars and trying to kick the lamp off the driver's cap. It was also discovered that the slowest mule, or the one that balked on the hard grade, set the pace for the "pit."

Many things went awry, and evils were left uncorrected, but how could it be otherwise? This foreman had his cost figure in mind; if I recall correctly, it was 0.754732, and that's a hard one to beat unless you want to go upward.

So no grading was done, and passing places weren't provided; stoppings were made of single boards and indifferently clayed; rails and timbers were left lying at random and all energy was concentrated solely on getting out tonnage.

Ab uno, disce omnia, from one learn about all. I tell of a little mine, for if I should relate about a large one, the story would but fill a bigger page. The first man on a job is tried, not by the right standards, but by his own. He runs ever to beat his own record. When he fails in that, there's likely to be a change in the personnel of the staff at that mine.

The record for a day is enticing, but it's the final result that counts.

The Fairmont, W. Va., Coal Region

By R. Dawson Hall

The town of Fairmont lies on the Monongahela river, one and one-half miles below the junction of Tygarts valley and what is known as the West Fork. The two great anticlines of the Appalachian system lie to the southeast, and none but the more inconsiderable rolls lie to the northwest. The measures gradually dip as they are followed from Taylor county, so that northwest of the Monongahela river and its West Fork, the Pittsburg coal is unbroken, passing without trace of erosion beyond the confines of the State.

The Pittsburg coal is so even in quality and continues so unerringly wherever the surface has sufficed to cover it that where it occurs it is rarely possible to make out separate geologic areas unless we are willing to discuss very

This region is on the southeastern edge of a coal-field stretching beyond the confines of the State. The mines show careful planning of the inside work for economy and safety. The alternating-current transmission is in accord with the most recent developments of electrical science.

only the Pittsburg bed. At 51 mines the average percentage ran as follows:

ANALYSIS FAIRMONT COAL COMPANY'S COAL

Moisture	1.43
Volatile matter	37.47
Fixed carbon	53.83
Ash	7.27

Total	100.00
Sulphur	2.59
B.t.u.	14,014

The thickness of the coal is about 8 ft. 6 in. At a height of 4 ft. 6 in. above the bottom is a band $\frac{3}{4}$ in. thick, surmounted by about 6 in. of coal and another $\frac{3}{4}$ -in. band; then follow 30 in. of coal of good quality, overlain with 12 in. of less desirable coal which is not persistent in its thickness.

The Sewickley coal in places runs as thick as 5 ft., but so far it is not favorably regarded for operating purposes.

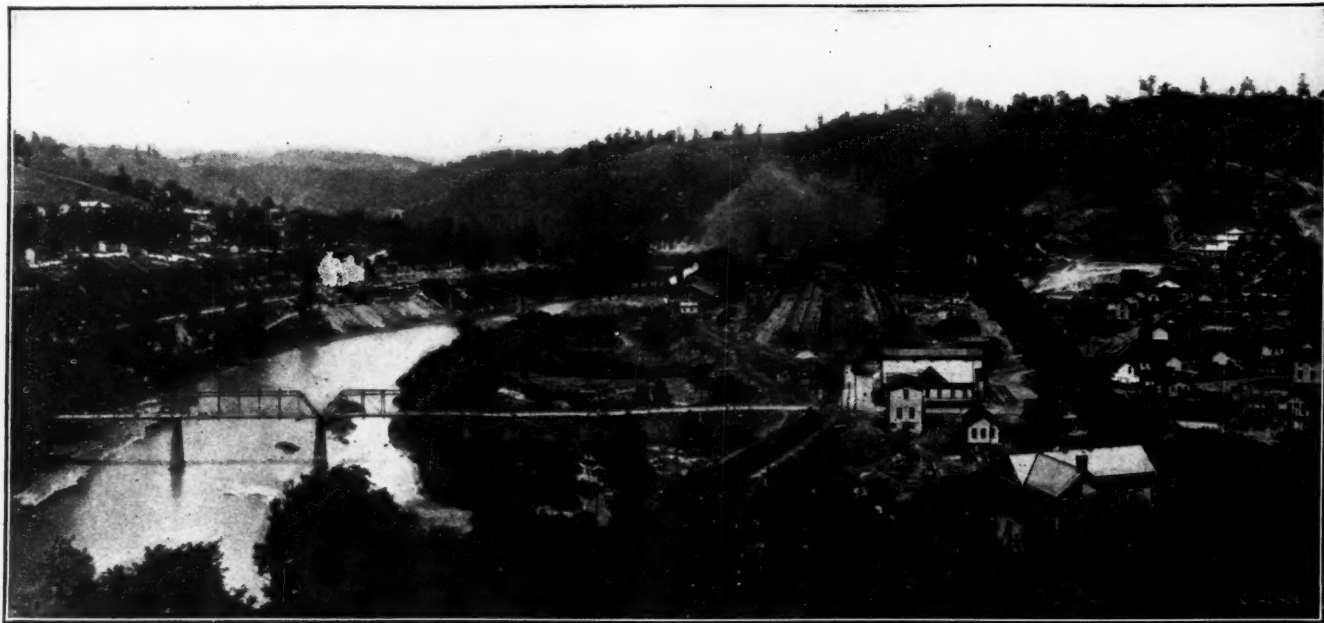


FIG. 1. CONSOLIDATION COAL COMPANY, MINES 43 AND 63, MONONGAH, W. VA.

large bodies of coal. So the Fairmont coalfield must be regarded as merely a trade or economic designation arbitrarily applied to an ill-determined section of the unbroken field lying northwest of the line of the West Fork of the Monongahela river between Morgantown and Clarksburg and to that other and much broken field lying to the southeast of the same dividing line. Like all fields it is named after the natural line of approach rather than on any more scientific basis.

THE BED MINED IS THE PITTSBURG

The coal bed mined is the Pittsburg, but in one place coal is being taken from the Sewickley. Within the limits described, no attempt is being made to mine the Redstone. The Pittsburg coal is a good clean bed, the analyses of 51

samples taken by the W. Va. Geological Survey from as many different mines averaging as follows:

ANALYSIS PITTSBURG COAL

Moisture	0.7
Volatile matter	38.5
Fixed carbon	54.5
Ash	6.3

Total	100.0
Sulphur	2.25

The amount of volatile matter increases to the south of the field and the fixed-carbon content decreases. The sulphur percentage toward Fairmont is only about 1.2, and for the whole area north of Clarksburg it is only 1.7, but south of Clarksburg the percentage will equal nearly 3.2. It might be well to quote here the figures prepared by the Fairmont Coal Company, which is now merged into the Consolidation. This concern, before and after merging, mined

COAL IS NEAR WATER LEVEL

The coal goes beneath the West Fork just above Watson, and emerges just above Monongah. Immediately below Worthington it again sinks below water level, emerging above Hutchinson near the line between Marion and Harrison counties. South of this point the Pittsburg bed is everywhere above water level, and this is also true below Watson except for a short length of immersion between Fairmont and Montana.

Thus it happens that nearly all the mines have slopes by which the cars are lifted to the tippie height. The valley being narrow, in many cases, mines are opened on one side of the river and the coal dump and plants are situated on the other, with bridges connecting the opposing river banks.

METHODS OF EXTRACTING COAL

The Consolidation Coal Company so completely dominates this region that a description of the methods and developments of that company is virtually a description of the district.

The mines have usually seven or eight headings in parallel for the main haulage roads and their airways. In the accompanying drawing, which shows a typical development, there are a manway and three main-haulage headings in the center, with two pairs of airways on each side of these four, one pair serving to

larger and less regular than that of the gas from the coal. Before this the company had been successful in keeping the percentage of gas in the returns down to a certain safe figure, far below possible danger. Every precaution is being made to remove the natural-gas menace and I do not know a place where the methods adopted to protect the mines against leakage from wells, have been more carefully considered. And if the present plans are consistently followed, it is unlikely that there will be any further explosions from that cause. The

from them are 300 to 350 ft. apart. These butt headings are also in duplicate. But they are worked in groups of three both for purposes of ventilation and coal extraction. One current ventilates three pairs of headings passing up the airway and down the haulway of each in turn, but not returning to the main butt heading, being passed from airway to airway by rooms, driven specially for that purpose, just short of the face heading.

By this means, doors are kept off the important roads and if left open do not destroy the ventilation of the whole panel,

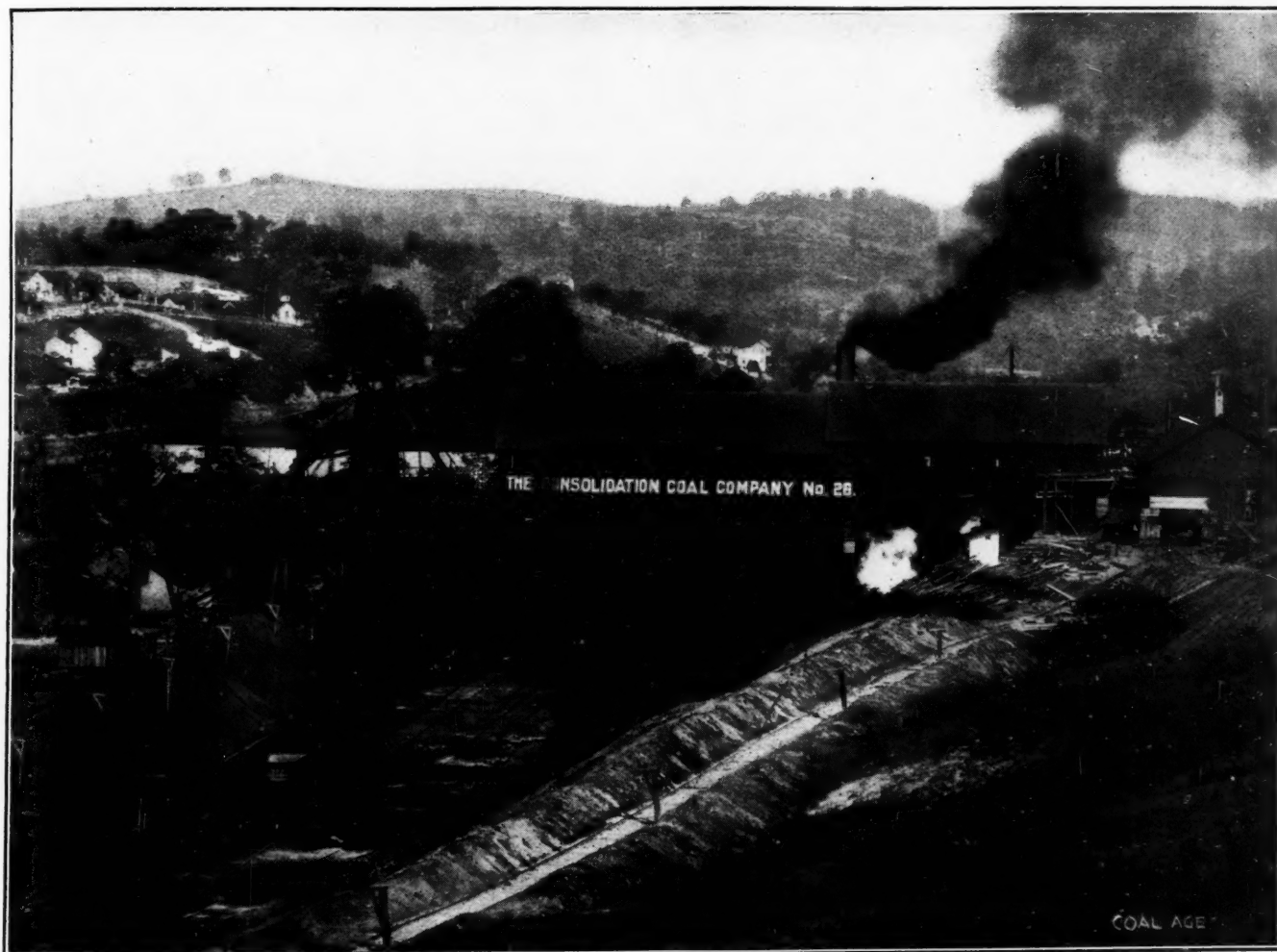


FIG. 2. CONSOLIDATION COAL COMPANY, MINE 26, NEW ENGLAND, W. VA.

feed the air to the south-face headings, and the other performing the same office for the north-face headings. These airways do not meet until they reach the shaft. The air is fed in every case by blower fans, so that the haulways carry return air. It may be said that the Consolidation Coal Company regards what little coal gas is in their mines as of small importance compared with the coal dust of which they have had such distressing experience at Nos. 43 and 63. However, the recent explosions of No. 49, arising from the entry of gas escaping from nearby wells, has somewhat modified the situation, the outflow from these being

favor shown the blowing fan largely arises from the fact that the air can be saturated with water vapor before it is passed through the headings when the air is blown into the untraveled airways. It is impossible to humidify effectually where men and mules are passing. At best the heading can be made wet, but the air is not so filled with moisture that it is prevented from drying out the dust in the rooms.

The face headings are as a whole driven in pairs, the air traveling in by the airway and out by the haulway. These face headings are set at 1500- to 1800-ft. centers. The butt headings

but only of the three butt headings which form one unit.

NARROW CHAIN PILLARS

It is interesting to notice the narrow chain pillars 15 ft. wide, the headings being 25 ft. from center to center. This is good practice. It is safe to say that if the wing pillars are not competent to uphold the weight, no chain pillars can make up for their weakness. There is no lack of strength in the wing pillars. Note the pillar 175 ft. wide flanking the main butts. The block of coal guarding the face heading from the weight of

the secondary butts is never less than 100 ft. thick. The curves to these butt headings are quite sharp, being struck off at a radius of 63 ft.

The last rooms in the butt headings are driven first and run completely through to the back heading. As soon as they reach their destination they are drawn, the withdrawing line being at about 45 deg. to the line of the face. Thus there are but few men in any heading and the combining of the three headings in a common split is in accordance with good practice. In other regions the angle with the face is much less and consequently a large number of men work in each heading, which plan influences the splitting provision.

RECOVERY NEARING 95 PER CENT.

It will be seen that with rooms only 20 ft. wide and placed at 60-ft. centers,

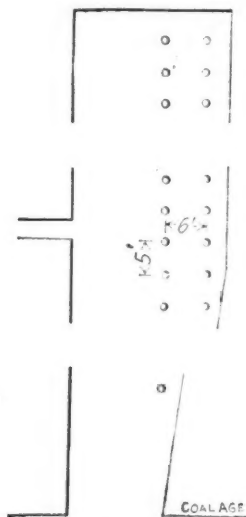


FIG. 3. ROOM POSTING



FIG. 4. PLACING SHOTS

the recovery of first mining is nearly 33 per cent. As the cover is about 250 ft., it will be realized that a conservative method of work is being followed. In many cases the proportion of coal finally extracted in the new development is 93 per cent. of the whole coal even where the roof is weak. In much of the old work in the region, rooms have been driven up and allowed to stand with the pillars intact, but these are now being drawn. It is a clearly demonstrable fact that conservation pays, not merely because it saves coal, but because it enables the most to be gotten out of improvements and developments and staves off by some few years the unwelcome day

when haulage, drainage, ventilation, power transmission and equipment of all kinds become burdensome in the extreme as the workings are pushed further and further from the original point of development. Many mines come to an untimely end because lack of conservation has made costs of production so high that they can no longer be worked at a profit.

UNDERGROUND WORKINGS HAVE PARAMOUNT CONSIDERATION

To promote this conservation, the Consolidation Coal Company has made a

ing of shots is regulated, and from this close surveillance comes the high percentage of coal saved. In many recent mines, there has been a notable and deplorable tendency to give a scientific treatment to outofdoor problems and to leave the subsurface operations to the mine foreman as soon as the shaft bottom has been laid out. Yet the underground problems are the most important of all those pressing for consideration, and should receive first place.

In Fig. 3 is shown the 'ordained method of placing props in a standard room which measures from 18 ft. to 20 ft. wide.

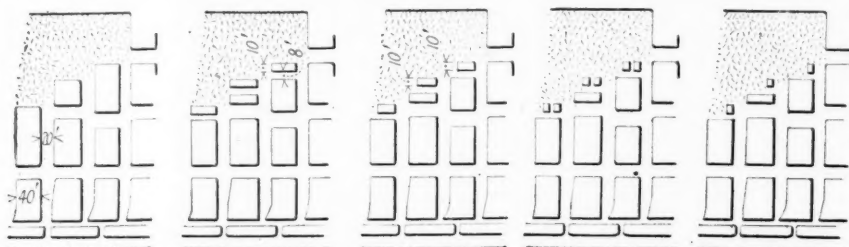


FIG. 5.

FIG. 6.

FIG. 7.

FIG. 8.

FIG. 9.

METHOD OF EXTRACTING PILLARS, FAIRMONT, W. VA.

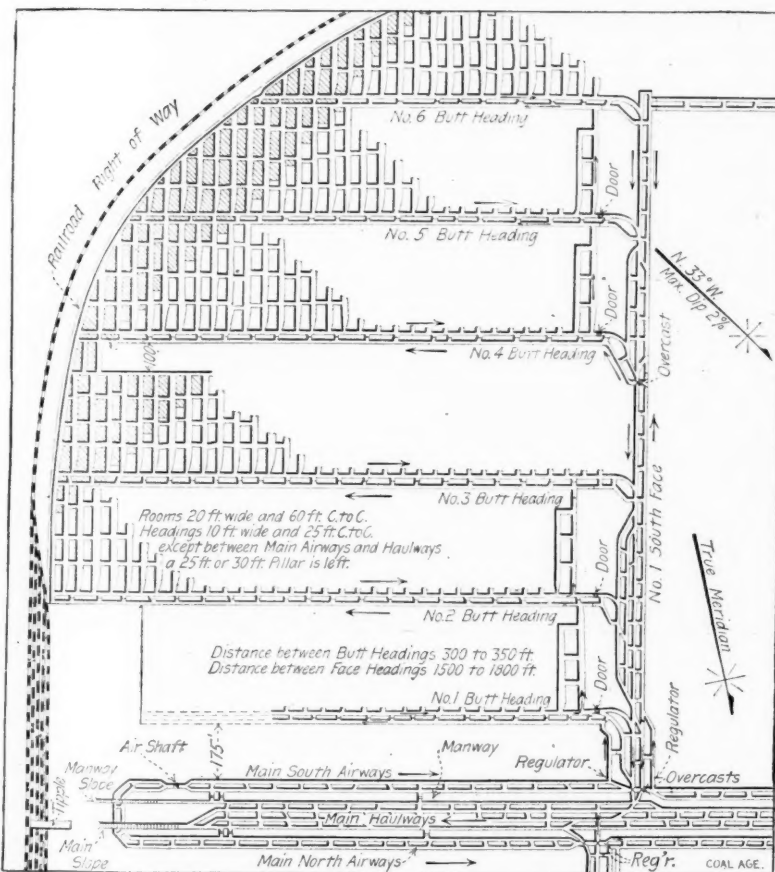


FIG. 10. METHOD OF MINING IN FAIRMONT FIELD—RETREATING IN BLOCKS OF THREE HEADINGS

study of the best methods of mining, and has not left the manner of working to the individual discretion, or rather, as it is too often, to the individual indiscretion of the miner. Thus room driving, post setting, pillar drawing and plac-

These props cost about 12c. apiece and are used with economy. About 63 per cent. were recovered in Mine No. 25. The miner is paid 5c. for every prop he saves. In Fig. 4 is shown the method of placing boreholes after undercutting.

The so called "gut-shot" is placed first, level and centrally located, and the two rib shots are placed next in boreholes bearing up toward the roof which they reach at their further extremities. The rooms are all widened

METHOD OF PILLAR DRAWING

Fig. 5 shows a condition in pillar drawing which is, of course, never reached in practice. Three room pillars are drawn fully across from room to room simultaneously. This synchronism is used

actual practice. Fig. 6 shows the appearance after a crosscut 8 ft. wide and the full width of pillar (40 ft.) long has been driven so as to leave a 10-ft. strip fronting on the caved area. This strip is reduced by extracting 8 or 10 ft. of

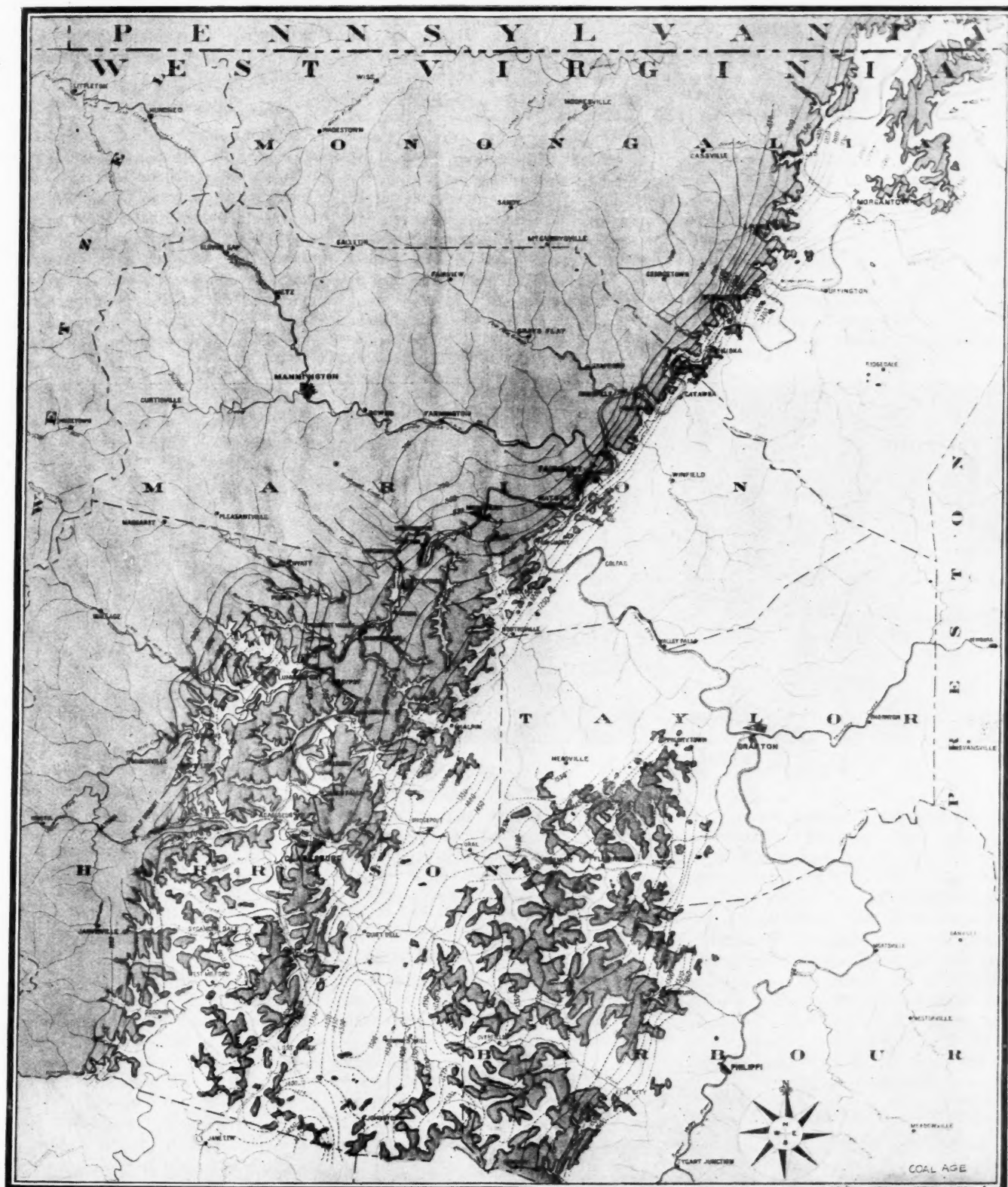


FIG. 11. PITTSBURG BED WITH CONTOURS, FAIRMONT REGION, W. VA.

in the direction of advance of the pillar drawing. There is no departure from this rule, which is essential for complete extraction.

here to simplify description, and the same objection may be made to all the following figures, and the same reason must be held to extenuate the variation from

the far end or as much of it as is possible. This is shown in Fig. 7. In Fig. 8 this block is shown split by a narrow crosscut leaving two pillars almost

square. In Fig. 9 the remoter pillar has been withdrawn, and all that remains to be done is the removal of the nearby pillar. After all, this is the most difficult work and it is here that what little coal is lost, has to be left in.

FANS FIXED AND PORTABLE

The fans used are powerful and housed in housings with roofs so weak that they are expected to be lifted off the building should an explosion occur. However, these mine safety valves are loaded more heavily here than in most regions, and it is questionable whether a happier mean could not be struck between the overlight explosion door of the fan makers and the roof which here finds favor as a release valve. It is not easily replaced. Its resistance is not easily measurable. The average explosion door is excessively sensitive, and perhaps the method here preferred may be ample to safeguard the fan. It may

south-face heading of No. 43 mine. The two mines are disconnected by this barrier so that the misfortunes which may happen to one mine will not involve both, but at the same time in a short while rescuers could pass from the one uninjured mine to the very fore-front workings of the other.

There seems to be all through an earnest attempt to determine a course of action before a disaster occurs, and only when this is done will rescue work be really effective. In passing, it may be said that the Consolidation Coal Company's officials firmly favor reversal of the fan in cases of explosion and recently had brilliant confirmation of their reasoning in the successful recovery of No. 49 mine after a severe natural-gas explosion.

The coal gas in the mines is easy to control as it occurs not in the falls, but in the virgin mineral and does not escape in blowers. There are no safety

This is worked from the ground. One man can handle three or more cars. He passes for this purpose from track to track and employs his entire time on this service. The device which is moved with the car is attached by a chain to the drawbar of the gondola; thus the feed can be made absolutely certain. The device is to be commended as it saves labor, time, life risk and expensive wrecks.

THE PURPOSED ELECTRICAL DEVELOPMENT

The Consolidation Coal Company is endeavoring to bring its electric work into line with recent developments and it is now taking current at 22,000 volts from the lines of the Fairmont & Clarksburg Traction Company. It is using 2200 volts for its main pumps and 250 volts for mining machines, haulage motors and the smaller pumping equipment.

The following description of the plant

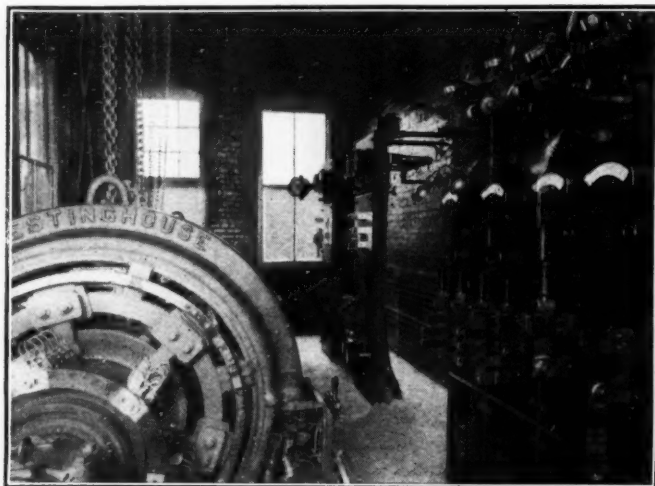


FIG. 12. ROTARY ROOM AT MINE NO. 63

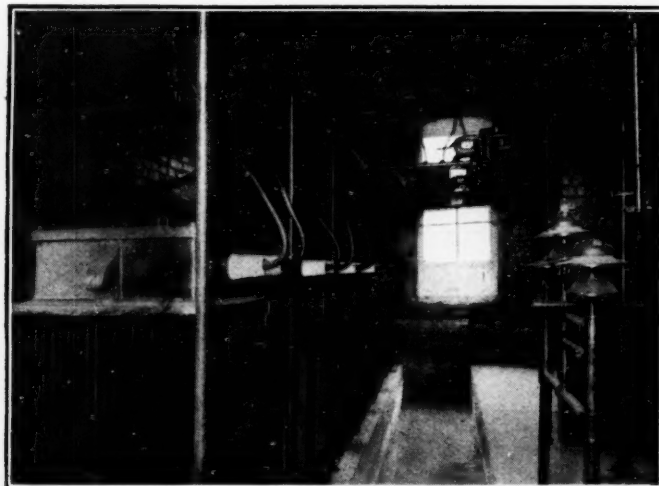


FIG. 13. TRANSFORMER ROOM, MONONGAH, W. VA.

be said here that the Consolidation Coal Company has a portable fan loaded on a truck ready to be hauled to any of its mines should one of its fans become disabled. There is no lack of intelligent foresight being used to prepare for the possibilities of a disaster. Humidification and permissive explosives have been adopted for the prevention of explosions, but the belated cures have not been overlooked, for the owners and managers know that the best laid plans are liable to fail under stress of certain combinations of circumstances.

SEPARATE AND CONNECTED MINES

As merely a sample evidence of that caution may be mentioned the barrier pillar between Mines 43 and 63. This is in one place only 12 ft. thick. An undercut 6 ft. deep, tapering down to nothing at the rear, is cut from No. 4 south-face heading of No. 63 mine and another like cut is made from No. 3

lamps used. Horses and mules are used for gathering, but motors are used for the main hauling, bringing their loads to the foot of the slope. From thence they are drawn out by rope.

PASSING RAILROAD CARS UNDER TIPPLES

The older mines of the region have wooden tipples, long and high like those of all regions where coal has to be sized. There is no need for cleaning other than such as is performed by the car trimmers. Perhaps the most noteworthy feature is that most of the tipples have conveniences for the lowering of railroad cars without recourse to the inefficient pinching bar which is always dull and uncertain in action. Here either the car is pulled forward by a rope or else the grade is enough that the car constantly needs restraint. In the latter case no reliance is placed on the car brake, but a clever patented clutch device with a long lever handle is used on a third rail.

that it is about to install was given me by one of the officials of the company: Three gas engines of 1500 h.p. per unit will operate three-phase 2200-volt 60-cycle generators and the current will be stepped up in the power plant by means of single-phase transformers connected in delta. By this means the current will be raised to 22,000 volts. All transmission lines will carry this current. In the substations it will be stepped down by transformers to 185 volts of alternating current, then by means of rotary converters it will be changed to 250 volts direct current. This covers the main system. The copper conductors carrying the full current of 22,000 volts will aggregate in length, 31 miles. Wherever it is considered economical for the reduction of the amount of copper necessary in the feed wires, substations will be placed within the mine. Where that is done the current will be transformed from 22,000 volts to 2200 at the surface.

The power will be taken into the mine through three-conductor armored cables placed in a bore hole located exactly over the substation. Where there are large pumps of 100 h.p. or over, they will be operated by 2300-volt induction motors. Wherever practical, the pump and substations will be placed close together for operation by one man. Telephones will be put in substations within the mine connected with the outside.

HIGH-TENSION SUBSTATIONS

Wherever 22,000 volts are to be taken to a substation a separate high-tension room is used. This room will contain

electrolytic lightning arresters, except where these are placed on the roof. This room will also protect the oil-circuit breakers and substation transformers. The low-tension room will contain rotary converters and a switchboard. In each rotary room a triplex chain block, mounted on a trolley, will be used for placing and handling heavy machinery. For use in switching on the 22,000-volt transmission line, three-pole single-throw and three-pole double-throw and fused horn-gap switches will be provided. These will be mounted directly on poles and will take the place of special switching towers which contain the usual oil

or stick-type circuit breakers. It will be seen that this proposed plant is to be fully up-to-date and its successful installation and operation are anticipated with interest. The illustrations show parts of the plant already completed and in operation. These receive power from the F. & C. Traction Company.

A cordial recognition should be given to Everett B. Moore, chief engineer of the Consolidation Coal Company, for assistance in obtaining the foregoing information. It would be hard to acknowledge duly the many courtesies extended by a host of others during my trip of inquiry.

Proposed National Coal Combine

By Walter Williams*

Mr. Williams shows the necessity of a national organization of the coal operators, such organization to be subject to the restrictions of a Government commission.

*President, Hart-Williams Coal Company, Chicago, Ill.

NOTE—Paper read before recent meeting of American Mining Congress, Chicago, Ill.

The conditions that have brought about our present status in the mining industry are merely discovered between the vested rights of property and the rights of men. We are only reaping the whirlwind that has been sown. The tremendous opportunities for industrial development in this country following the Civil war, caused the creation of great corporations, such as the Standard Oil Company and the great railroad systems of this country, and they have abused the privileges that were theirs, as men always do. They are not to be blamed, because the law permitted it and the people are to blame because they made the law or failed to make the law, and the condition that confronts us today we cry out against. The assault upon capital, the assault upon the railroads, the assault upon corporations is merely the natural result of the great combinations in this country.

The Sherman antitrust law was a blind effort on the part of the great masses of the people who felt the repression, who felt the effort of these gigantic corporations to get control of the sources of supply, the necessities of life, the transportation of the country, and feeling that the Sherman antitrust law was a blind effort on their part to check it, and naturally such blind effort was not constructive in its nature. As one of the speakers said, it was repressive, and the Sherman antitrust law was merely a blind strike in the dark on the part of the great mass of people to check this.

THE PRESENT LAW

The Supreme Court of the United States in my judgment could not do anything else than what it has done. The purpose of the Supreme Court is not constructive, it is merely interpretative. This law is put on the statute books and it is theirs to interpret and the executive of this country to enforce; neither the Supreme Court nor the President are to blame. They can do nothing else under the circumstances than just what they have done. Mr. Taft

and Mr. Wickersham are merely following out their plain duty, when they say that these gigantic corporations must be dissolved.

Now what must be done? They are doing their duty, but it is not going to relieve the situation in this country. It is not going to relieve the fearful condition that the coal business of this country presents. The constructive part must be done by the legislatures of this country, and now that the Sherman antitrust law has been interpreted, and now that the effort is being made to enforce it, the people are becoming aroused to the futility of the enforcement of that law and the tremendous loss that is going to come if it is enforced.

Combinations in this country are inevitable. All we need, or the thing we need, is not to do away with combinations. The thing we need is to do away with unreasonable oppression which combination gives an opportunity to put into effect, and combination must be permitted.

It is futile to expect a congress that is made up of a changing body of men, changed every two years, to investigate the industrial condition of this country and construct laws that are going to meet the needs of this country. What can a man from any district know about legislation, and what can he know about con-

structive statemanship? What if he does know can he accomplish in that time? We must resort to some form of commission, a scientific commission, a commission that will be appointed or constituted to exist over a term of years, who shall go into this question and study it to the bottom, study it from the scientific standpoint and arrive at a just conclusion as to what is right between all the parties interested.

RESTRICTIONS NECESSARY

Now you men who are in the coal business are clamoring for an amendment to the antitrust law that will permit you to combine, and there you stop. You must be satisfied also to not only be permitted to combine, but to be restrained from plundering the great body of people by the use of strong combination or a too powerful one. I am a coal operator myself and I see the necessity for combination, but, gentlemen, we must take with it the inevitable consequence that will follow, the restrictions drawn around us so that we cannot in certain seasons of the year exact an exorbitant tribute.

Why have we not acted? A large measure of blame was put on us as well as the Government, and one reason why we have not acted we realize the condition is because we are born gamblers, and there is not a man in the coal business today, and bad as the condition is, but what hopes that the recurrence of that high tide of prosperity that occasionally comes to the industry will arrive before he is forced into bankruptcy, and out of business. We are satisfied in the summer time to trade a dollar for ninety cents, in the hope that when September and the winter months come we may trade the dollar for \$1.75 or \$2. Business will have to be put on a basis of reasonableness, which shall prove to be permanent.

Now with the desire for combination must come also the recognition that there must be restriction of an unlimited profit. That has come to the railroad. The com-

mission has fixed certain maximum prices that they can charge for the service they render. It would not be a bad thing for the coal industry and I offer it as a suggestion. Suppose we had a commission that would fix the maximum price that we could charge for our product, and that this price was fixed after an intelligent study of the business by all of the parties interested; the operator, the workman and the public; and fixed so that there would be a reasonable profit, because the hazards of the business demand that the profits shall be more than comes to the ordinary business. Then permit combinations whereby the maximum price that the commission fixes shall be the minimum price that the operators will charge to the public. The commission idea is the one that is going to make itself felt in every line of endeavor. I am a democrat in politics, but I am heartily in favor of Mr. Taft's idea, and this is in opposition to many of the ideas of the party that I represent. I can see a certain amount of justness in the attitude that he has assumed with regard to the revision of the tariff.

CONCERNING THE ILLINOIS LEGISLATURE

The legislature of Illinois, as at present constituted, is as wholly incompetent to deal with this question as a new-born babe. Its shame is written broadcast all over this country, and how can you expect a body of men such as that to deal with a question that is fundamental in its nature, and that affects the business interests and a tremendous capital and a tremendous body of men.

Over 50,000 men are working in the mines of the State of Illinois, millions of dollars are invested, the great population is dependent upon the industry in this country for its fuel, and tremendous industries are dependent upon it for the power to turn their wheels. Now to submit this question to a body of men elected haphazardly, this year in and the next year out, would be disastrous. It must be submitted to a body of men who can investigate it and who will do it and bring in a report, bring in constructive legislation that will have in mind the rights of capital to a reasonable profit upon their investment and upon mental toil; and, on the other hand, of labor to a reasonable share of the profits in the industry in which the men toil, not only for their daily bread, but an opportunity to lift their eyes above the ground occasionally and see a glimpse of an opportunity for education, and some of the cultural things of life.

We cannot continue as we are. We must be allowed to combine. If we are not allowed to combine the ruinous competition in which we are engaged will wipe the industry out of existence, so far as those engaged in it are concerned. The industry will not be wiped out, but

new capital will come in and reorganize it upon a new basis. Let me say to you that those who today have opposed the enactment of any law permitting greater profit to the business, who would oppose any change in the Sherman antitrust law, would be short-sighted.

Let me tell you they will pay high interest for every dollar's worth of coal that they are buying for 90c. For every dollar's worth that they buy for 95c. they will pay \$2, and why? Simply because the profits that have been lost must be made up. The bankers must be repaid the money that has been borrowed, the red ink must be written off the ledger, and the tremendous waste in the industry as it is today constituted must be paid for in the future; and we have no right and those who are buying coal today have no right to plunder the resources of this country, to waste the heritage of those who shall follow, in a crazy desire to buy a thing for less than it is worth, a thing which is one of the greatest necessities of human life.

Anthracite Miners' Demands

SPECIAL CORRESPONDENCE

The convention of the anthracite miners' union, districts Nos. 1, 7 and 9, was brought to a close at Pottsville on Nov. 3, after formulating ten demands which are as follows:

1. We demand that the next contract be for a period of one year, commencing April 1, 1912, and ending, March 31, 1913.
2. We demand a work day of not more than eight hours for all inside and outside day labor, with no reduction in wages.
3. We demand recognition of the United Mine Workers of Districts Nos. 1, 7, and 9 as a party to negotiate a wage contract and the right to provide a method for the collection of revenue for the organization.
4. We demand a more convenient and uniform system of adjusting local grievances within a reasonable time limit.
5. We demand an advance of 20 per cent. on the rate of wages for all employees over and above the rates awarded in 1903.
6. We demand a minimum rate of \$3.50 per day for miners and \$2.75 for laborers.
7. We demand that the system whereby a contract miner has more than one working place, or employs more than two laborers, shall be abolished.
8. We demand that the rights of the check weighman and the check docking boss shall be recognized, and that they shall not be interfered with in the proper discharge of their duties.
9. We demand that all coal shall be mined and paid for by the ton of 2240 pounds, wherever practicable.

10. Your committee would recommend that a joint-scale committee, composed of the executive board of the three anthracite districts, together with the national president, be appointed by this convention and clothed with discretionary power to negotiate an agreement on the basis agreed to by the convention, and in the event of their being unable to do so, they shall be empowered to order a suspension of work in accordance with the laws of the organization.

The demands are much more radical than any of the delegates to the convention anticipated. They were formulated by the executive board of the three districts and were practically accepted without discussion or mitigation by the convention. After the convention had adjourned, the delegates seemed to be very reluctant to discuss them. All who were approached on the subject said that they approved of them heartily; that while they might be modified in this direction or that as a result of the negotiations with the operators, yet that on the whole they were equitable and that they must be conceded in principle if a strike was to be avoided.

President White aroused the enthusiasm of the delegates when he declared emphatically that the Conciliation Board must be wiped out and that the executive boards of the district unions must be recognized by the operators as representative of the national organizations. On the whole, however, he was optimistic as to the outlook for a peaceful settlement of the demands which had just been officially issued and seemed confident that the task of arranging an agreement on the basis of these demands would be easier than in 1900 and 1903.

CONSTERNATION IN BUSINESS CIRCLES

On the other hand, the demands have caused consternation in business circles in the anthracite regions. Business men recognize that the operators are in no humor and in no position to grant even a moiety of the demands, and they anticipate a prolonged strike if the last agreement is not accepted as a basis of the next.

An official of one of the largest anthracite-coal companies said: "The demands of the convention are preposterous. These demands simply amount to a requisition that we hand over the control of our property to the miners' union and that we act in subordination to them as their selling agents. We are not going to do anything of the kind. We are prepared to take into consideration any reasonable demands that the representatives of the miners make for an increase of wages on the basis of the existing agreement but we cannot and will not go any farther."

The Bituminous Coal Trade

So varied are the underground conditions and methods employed in coal mining in the State of Illinois alone, both with reference to the seams worked (from 30 in. to 10 ft. in thickness); the wide range of prices per ton paid to the miners; difference in quality of product; the variable cost of putting the coal into the cars for the market, that it makes a somewhat intricate and difficult subject to handle, particularly when coupled as it is with the attempt in our dealings with the Mine Workers' organization* to make each district fairly competitive with all others in the marketing of the product; therefore, the subject covering the entire country can only be reviewed in a general way.

With the exception of two or three States and some particular districts in some States, the industry was in a reasonably prosperous condition prior to the fall of 1907, when a general business depression occurred, and, with others, the coal industry suffered a material curtailment in production and a general lowering of values at that time. During the following year the production declined some 64,500,000 tons, but this loss in production has been subsequently overcome, and the figures for 1910 record the largest tonnage in the history of the industry.

With the further decline in prices during the current year, the situation has become a serious one, and in certain competitive districts where competition is unusually keen and where low prices have steadily prevailed for the past four years, many of the operators are dangerously near complete bankruptcy, and some means must be devised to relieve this situation if it is possible of accomplishment; otherwise the failure will be seriously felt by manufacturers and retail dealers everywhere.

DATA COLLECTED

In order to obtain the most authentic information possible along these lines, the secretary of this Congress sent out blanks to all the principal coal operators scattered throughout the country, making inquiry along the following lines:

1. Capital invested in business.
2. Average total cost of production.
3. Average labor cost per ton (mine workmen only).
4. Average cost of administration.
5. Average selling price at mine.
6. Estimate of increased cost necessary to meet demand for conservation.
7. Average depreciation of values per 100 tons daily capacity.
8. At what price coal must sell.
9. What percentage of coal is sold at a loss.

Briefly stated, these statements revealed the following conditions:

By A. J. Moorshead *

A review of the Illinois coal industry from its infancy. Some startling comparisons are shown regarding cost of production and selling price. The evils of overproduction are discussed and remedies suggested.

*President, Madison Coal Corporation, St. Louis, Mo.

NOTE—Abstract of paper read before the American Mining Congress, Chicago, Ill., Oct. 25, 1911.

That for every ton produced annually, there is an average investment of \$1.41 in coal lands, machinery and equipment necessary to that production. These statements show that increases in cost of production have been general in all States, varying from a fraction of a cent in States like Tennessee and Kentucky, to 28c. per ton in the southwest. The average increase is near 7c. per ton in all fields.

Increased selling prices are generally reported for 1910 averaging 4c. per ton, but it is not sufficient to offset an increase of 7c. per ton in production costs, during the same period, so the year as a whole shows a decline in profit.

During 1910 the total cost of production is estimated at \$1.07 per ton. The cost of mine labor and mine supplies total 95c. per ton, and the cost of administration, such as office expense, sales expense, accounting, insurance and taxes, legal expense, etc., usually classed as general expense, was 12c. per ton. This does not include interest, depreciation or profit.

The average price obtained at the mine was approximately \$1.11 per ton. The increased cost necessary to meet the demand for conservation was estimated in different fields from 2c. to 15c. per ton, with a possible average of 5c. in the country as a whole. The depreciation of coal reserves and plant equipment would require a fund of approximately 4c. per ton.

The increased prices necessary to make the business show a fair return on the money invested ranged from 5c. to 25c. per ton in various regions. The average increase requested would approximate 12c. per ton.

OVER PRODUCTION

Statistics show that while our bituminous coal production increased rapidly from nothing in 1821 to 1,111,156 tons in

1842; to 10,625,381 in 1865; to 105,268,963 in 1891; to 306,138,096 in 1906; and to 415,500,000 tons in 1910; our consumption kept ahead of or apace with production until 1891. In 1821, consumption was 19,617 tons in excess of production; in 1842, it was 123,879 tons in excess of production; but in 1891, the total consumption was only 105,016,407, or 252,556 less than production, and the difference has steadily increased until in 1906 consumption was 6,002,051 less than production. The excess of production over consumption has steadily increased each year, and has resulted with mines operating to a restricted capacity.

A further example of our over-production and still greater over-capacity was demonstrated during the strike period of 1910 in Illinois, Indiana and the southwest:

Illinois was idle six months of the year, but produced 45,900,246 tons as compared with 50,904,990 the previous year, working twelve months.

Indiana was idle some thirty days and produced 18,289,815, as compared with 14,834,259 in 1909.

Oklahoma, Arkansas, Kansas and Missouri were also idle six months in 1910, due to the strike, and the production showed an average decrease of only 20 per cent. under the figures for 1909.

The possible capacities of West Virginia mines is fully 75 per cent. over the present total production. The Pittsburg and No. 8 Ohio districts are reduced to 30 per cent. operation during 3 or 4 months of each year, while navigation is closed on the lakes. There are very few properties that have operated over 225 working days per annum during the past three years.

TONNAGE INCREASE

This over production and over capacity to produce has resulted in a ruinous competition to obtain business. Many of our coal properties have fixed charges in the nature of bonds and other obligations, such as minimum royalties, and in many cases the management figure their losses less by taking the low prices and operating full time than by obtaining their proportion of profitable domestic business.

The development of so many new high-tonnage plants in recent years has also had a marked effect upon the industry. When it is realized that our production and consumption to date have practically doubled every ten years, the large increase in the number of new mines can be appreciated. The "deadwork" haulage, drainage and ventilation costs are always lower in new development, on account of the concentrated area under operation, and they are able to produce coal much

cheaper than their older competitors. They fix the prices in the markets, which must be met by the older mines, but in time they have the same situation to face.

To meet this competition, underground development is too often carried on in such parts of the mines as can be made to produce cheaply and in order to escape the heavy yardage prices, excessively wide entries are driven, and this condition coupled with the narrowing of pillars in order to lessen the cost of operation, ultimately causes heavy falls and squeezing to such an extent that the mines are robbed of half of what would otherwise be their natural existence, and in their early abandonment large acreages of coal are wasted without hope of recovery.

PRICE FLUCTUATIONS

Statistics show that the average prices received at the mines during the past seven years are as follows:

1904	1905	1906	1907	1908	1909	1910
1.10	1.06	1.11	1.14	1.12	1.07	1.11 est.

The average price for the entire period has been \$1.10 and the fluctuation between the maximum and minimum prices has been only 8c. per ton. It is also interesting to note that the prices for 1910 and 1904 and the average price for the period are practically identical.

During 1910 the increased cost of production as compared with the previous year is estimated at 7c. per ton in all fields. Some idea of the increased cost of producing coal can be obtained from the following table, which shows the mining rates in the four largest States operating with organized labor. All other districts show similar increase, but the amount is difficult to ascertain:

	Base Rate Illinois	Indiana Mine Run	Bitum. Lump	Thin Vein W. Va.	Hocking Ohio Lump
April 1, 1898, to April 1, 1900.....	40c.	40c.	66c.	66c.	66c.
April 1, 1900, to April 1, 1903.....	49	49	80	80	80
April 1, 1903, to April 1, 1904.....	55	55	90	90	90
April 1, 1904, to April 1, 1906.....	52	52	85	85	85
April 1, 1906, to April 1, 1910.....	55	55	90	90	90
April 1, 1910, to April 1, 1912.....	58	58	95	95	95
Increase, 14 years.....	18	18	29	29	29
Equivalent on run of mine basis.....	18	18	18.74	18.74	18.74

The above increase applies only to the "mining rate"—that is, the amount paid to the miner for loading one ton of coal at the face, and proportionately higher wages are paid to all other mine workers. The full increase in cost of labor

per ton over this period is, therefore, 27c. per ton, and approximately 9c. of this increase has been taken since 1904.

With prices practically stationary during this same period the profit to the operator shows a net decrease of 9c. per ton.

We have already stated that for every ton produced annually, there is an average investment of \$1.41 in coal lands, machinery and equipment necessary to that production.

THE NATIONAL TRADE

Based on an annual production of 415,000,000 tons of bituminous coal, there is an investment in the business of some \$585,000,000. An investment in an industry of this nature, carrying the risks to life and property which mining industry does, and the hazard of faulty conditions of seam, which no man can definitely foresee, should net at least 10 per cent. in return as interest on the capital invested, after setting aside a sufficient amount—estimated at 4c. per ton—to cover depreciation of equipment and exhausted coal lands.

The mining industry should net to the owner annual earnings of \$75,100,000. They earned \$16,600,000 in 1910, and the current year will show still further reductions. In other words our coal operators are absorbing as losses in excess of \$58,500,000 per annum, or slightly in excess of 14c. per ton.

Over-production is the cause of this extremely deplorable situation. It has created a destroying competition in which only the strongest can survive. It has caused a general unrest in the industry and dissatisfaction to mine owners and mine workers alike, and the question before us is how this over-production may be taken care of and the business placed on a remunerative basis. Two solutions are suggested.

SUGGESTED REMEDIES

First. The creation of district sales agencies to handle the entire produce. These agencies would control the total output and name prices which would return a fair profit on the investment and at the same time permit the necessary expenditure for conservation of resources and careful and safe mining. Such agencies would result in a very large reduction of the present sales cost, and, by concentrating the mining operations, the ultimate cost to the consumer would probably show little increase. These agencies could maintain a more uniform distribution and by concentrated effort could probably reach new markets which are not being supplied from the United States.

This plan would require the alteration of the Sherman Anti-Trust Law and the creation of an Interstate Coal Commission. The commission would have to pass

upon the justness of prices established by the various district agencies, to see that owners obtained fair prices only, and to hear the public voice in reference to such matters. The commission should also control the opening of new mines in such a way as to keep production and consumption apace with one another.

Second. The Government could assist in the development of foreign export trade. A large percentage of the total production of this country is available for profitable export, and by directing the surplus production from Eastern Pennsylvania and Eastern Virginia, which is now encroaching upon the trade formerly enjoyed by Illinois, Indiana and Ohio, the solution would at least be partly reached.

FOREIGN REMEDIES USED

Other countries have had their coal problems similar in all respects to our own, as now existing.

Great Britain met it by the most careful of mining methods and preparation of the product; and combination with transportation interests have gained for her the markets of the world for her surplus, at highly remunerative prices, and this result is only possible by continuous operations and large export shipments. British exports have been:

In 1907.....	63,600,947 tons
In 1908.....	62,547,175 tons
In 1909.....	63,076,799 tons
In 1910.....	67,085,476 tons

It took Germany many years to perfect a coal syndicate which, under a single sales agency, with the coöperation of the government, has produced substantial returns to the mining companies, and at the same time increased the export tonnage; and there was shipped in this particular class of trade:

In 1909.....	10,321,536 tons
In 1910.....	10,963,195 tons
In 1911.....	12,614,952 tons

It should be the duty of this congress to carefully consider ways and means of working out the problem; additional legislation is necessary and capital, together with labor and the consumer, should appreciate the benefits to be derived from placing an industry of great magnitude upon a substantial basis.

Wonderful results have been accomplished for the benefit of agriculture by the national government appropriating from \$20,000,000 to \$40,000,000 per year for the last twenty years for that particular industry, yet mining—important and hazardous as it is—has received but little consideration. This organization can, by thorough, concerted and determined action, not only arouse public interest in our cause, but the State and national legislators will, beyond doubt, when the condition of the industry is properly made known to them, afford relief no less generously than Great Britain and other foreign governments have done.

Compensation vs. Liability Acts

By John H. Jones *

In presenting the result of the labors of the special committee appointed to consider and report upon the subject of a workmen's compensation act, I desire to call to your attention some of the things which form the basis of the reasoning of your committee.

The subject of employers' liability and workmen's compensation, in one form or another, has agitated the minds of men for years. The justice of it all is generally conceded, and American industry is still seeking the best direction in which to move to accomplish the object of its faith.

The coal-mining industry is no stranger to either "liability" or "compensation," nor did it wait for law to suggest, demand or compel a reasonable care, in one form or another, of those injured in the pursuit of the industry.

It is natural, then, that a subject of so vital importance to the industry should engage the serious attention of the Mining Congress.

One of the most important points in the whole matter is to decide upon the best direction to follow. On this point we have the experience and opinion of practical men in this and other countries. It has been stated that what has been done in England, and what has been done in Germany, are the most important types of action on this subject which we can study.

AN ENGLISH OPINION

A. H. Gill, member of Parliament, of Balton, England, says in substance: "In England, before the eighties, the common law was the only means of adjustment between the injured and his employer; when negligence of the employer was not apparent or proved, it was hard to get compensation. The working people became dissatisfied and began to agitate for a new law, and as the result an Employers' Liability Act was passed in 1880, and while it was an improvement on the common law, the act was not a success, as it embodied the doctrine that an employer should not be liable unless negligence was proved. It has, always, been difficult to succeed in an action under the act, as so many means could be found of resisting a claim. The result of the failure to secure compensation caused a further agitation for an improved method of dealing with the problem. This agitation bore fruit; for in the year 1897, an act was passed known as the Workmen's Compensation Act. This act did away with the doctrine of contributory negligence and made the employer liable to pay compensation to a workman who lost

After reviewing the experience of various countries, a workmen's compensation act is urged as preferable to employers' liability from the standpoint of the mining industry. The former may prove difficult to frame. The latter is believed to be wrong in principle and practice.

*President, Pittsburg-Buffalo Coal Company, Frick building, Pittsburg, Penn.

NOTE—Address read before meeting of American Mining Congress, Chicago, Ill.

time through any accident which occurred while following his employment."

It is not necessary to enlarge upon this act, but simply to draw to your attention and emphasize the fact that 26 years of agitation by workmen, and 26 years of study and experiment, by practical men, resulted in a *Workmen's Compensation Act*.

This opinion is fully confirmed by Attorney Packer, of Washington, D. C., who was retained by the United States Government to investigate the matter.

TWO VIEWS ON LIABILITY ACT

Another opinion dated Washington, D. C., Dec. 24, 1910:

"The Illinois legislature should enact a liberal employers' liability act at the special session and then undertake an investigation with a view to the introduction of an automatic compensation law, for THAT view observers now regard as the most feasible and just solution of the vocational ills, accidents and death."

(Signed) Samuel Gompers, president American Federation of Labor.

And another:

"In spite of the fact that every one of the industrial nations of Europe has discarded the system of paying damages on the ground of the liability of the employer and has adopted in its stead the payment of compensation for industrial accidents: in spite of the fact that New York has adopted a Workmen's Compensation Act, and that both Wisconsin and Minnesota are considering compensation as the only feasible solution of this problem, the Chicago Federation of Labor and its representatives on the commission have taken a decided stand that

the abrogation of the employers' defenses must precede any bill providing compensation.

"It is evident from the letter which the Federation submits that its officers are not only unfamiliar or unmindful of the economic waste involved in any employers' liability system, but that they have no knowledge of the total inadequacy of such a system, even when extended by such serious modification of the employers' defenses as the American Federation of Labor advocates.

"An employers' liability law meets none of the prime necessities of definite compensation, immediately and automatically paid. Under it every case is a gable." Signed by the six "employer" members of the commission of twelve, Illinois Employers' Liability Commission.

GERMAN EXPERIENCE

Again, Major A. R. Piorkowski, representing the Frederick Krupp Company of Essen, Germany, and speaking for the German system:

"The German Accident Insurance had its predecessor in the Liability Law of 1871, by which the operators of industrial establishments were liable for the accidents caused by them. The injured workmen had to bring proof that the operator caused the accident, and the amount of compensation was determined by private societies. It is evident that such an institution could satisfy nobody. The consequences were long drawn out and costly law suits, by which the contrasting interests of employers and employee were glaringly brought to light.

"The more law suits between both classes, the more hatred and the less understanding there were for what was mutual in their interests. Employers, employees, and the Government looked eagerly for a better solution of the problem. Germans have been called a people of thinkers. They thought, and understood why the liability law did not answer the purpose, did not work for peace between capital and labor. It worked unjustly toward both of them. Therefore, the only logical and just way to compensate for the injuries done is by insurance.

"In 1900 this law received its present shape. All workmen and administrative officers—the latter, provided their annual earnings do not exceed 3000 marks—are insured against the results of accidents in the course of their employment if employed in mines, factories, and similar establishments specified by law. In case of disability, compensation is rendered from the beginning of the 14th week after the date of the accident."

CRITICISM OF STATE INSURANCE

If any gentleman present imagines that the German system would be a success in this country, let me quote from *The New York Commercial*, of Friday, Oct. 20, 1911—under the heading, "Liability Men Criticize State Insurance System."

"Nearly every speaker, alluded to a recent review of the German state-insurance system, written by Dr. Ferdinand Friedensburg, who has recently retired after 20 years at the head of the senate of the imperial insurance office of the German Empire. Dr. Friedensburg does not find the German system, as it has worked out in practice, by any means ideal but does not condemn the principles underlying the workmen's compensation for accidents.

"Dr. Lott quoted him as saying that charity crept in and corrupted the system at the beginning;" that "employers do all that is possible to escape their burdens, which they feel to be unjust and in vain enormous sums are annually exacted from them in fines," that "industrial unions and insurance institutions have been repeatedly on the brink of bankruptcy."

"Dr. Friedensburg points out that the excessive cost of the insurance system, which is one result of the degradation of the system into charity, is complained of by employers, and that state insurance therefore, reacts injuriously upon Germany's industry."

He says: "As a result of the costs of insurance which have gradually become monstrous, German industry is put at a disadvantage and is hampered to the extreme in its competition with foreigners."

CAUSED RISE IN PRICES

Indeed, Dr. Friedensburg makes the astonishing statement that the German system of workmen's compensation is held responsible for the marked rise in prices which is felt to be oppressive by all classes of the German population.

Mr. Wolfe is of the opinion that whether the state will undertake the employers' liability business to the exclusion of the companies depends upon the attitude of those companies and their disposition to coöperate with the state in the solution of the economic problem. He said that employers' liability insurance represents more than one-half of the entire liability business transacted and consequently the question of state insurance is of vital interest to the underwriter.

While heretofore the question may have seemed to the underwriters a fad or a form of socialistic doctrine and an interference with the right of contract, a discourager of thrift and an encourager of malingering and intentional accidents,

public opinion is overwhelmingly in favor of entering the cost of human accidents as a part of the cost of production, and the underwriters, in the opinion of the speaker, must face the situation accordingly.

Mr. Rowe stated that obviously the trouble with state insurance, viewed from an impartial angle, would be the mixing of politics with it. "Workmen's compensation insurance," he said, "can only exert its effect as a blessing if free from all exaggeration and particularly from the conscious or unconscious love-making with the 'lower classes.'"

"Such insurance," he said, "must be issued by an independent institution free from all partiality."

CHOICE OF TWO METHODS

Here then are introduced two methods, one the "Employers' Liability Act," which has been discarded by practical men, the other the "Workmen's Compensation Act," now before us, and between these two we are called upon to choose.

Your committee urges a Workmen's Compensation Act as best fitted, by experience and practice, to the mining industry.

The Liability Act appears, to your committee, to be unjust and unreasonable, in principle and in practice—the very mention of it suggests lawyers, courts, delays, annoyance, strained relations, expense to employers and loss to workmen. In one word it means "fight." The Compensation Act means "payment." The former is an unknown quantity; the latter is a fixed principle known and computed in advance, and provided for. The record of the Liability Act is said to be about 50 per cent. adjustment—the Compensation Act means 100 per cent. adjustment.

Adjustment under a Liability Act is reported, by one large coal operator, to be injurious in 80 per cent. of the cases in a large disaster, in that it would shower money into the hands of the inexperienced, where value is unknown, and where money and widows are soon parted.

Liability-law adjustment, in the judgment of the committee, is a mistake, is uncertain and unreasonable, is an injustice to all concerned, and is prejudicial to all the best interests of a miner's widow and children. It defeats a good intention, and does not insure the care, education and opportunities of life, supposedly vouchsafed to the husband and father, by a law which caused him to risk and lose his life in an honest belief, and a sincere endeavor, to provide for his family. In short, it looks as though the most ardent supporters of an Employers' Liability Law, are ambulance chasers, and those who could hope to profit by a disturbed condition, as between capital and labor.

SOME ERRONEOUS CONCLUSIONS

It is also conceded that labor is just as necessary for the maintenance of industry as any other commodity, and that the cost of compensation, as a fixed principle of industry, should be reckoned with in placing a price upon the finished product. Upon the grounds stated, we believe the Liability Act to be wrong in principle and practice, and that the injustice of it falls upon those who are least able to bear it on the one hand, and, upon the other hand, falls upon those who are supposed to be wealthy, but this supposition is based upon opinion thoroughly unfamiliar with the facts, and therefore incompetent.

POSITION OF MINING INDUSTRY

The mining industry should stand ready to bear the burden of its own accidents—it should stand ready to pay a tax of one cent per ton of coal mined to meet the necessities of the case and to provide the necessary funds.

It should stand ready to have this fund administered wisely in the interests of the workmen and their families.

It has always stood ready to consider, and has introduced every known precaution to prevent these accidents, and to safeguard every man employed above or below the ground.

It considers all this right, reasonable and just, and that the best direction to move in, to accomplish the best results, is the passing of the Workmen's Compensation Act.

In the preceding argument we have referred to the best direction in which to move to accomplish the best results, and have clearly stated our reasons in favor of the Compensation Act. There is another important point to consider with reference to this Act, namely; the mining industry must give its best thought to the method of introducing and passing the Act, it cannot be left to the unfamiliar majority. The necessity for reasonably uniform legislation by the different States of the Union must not be lost sight of. Uniformity of legislation on all subjects of common interest is one of the most important questions of the times.

The necessity for careful study, for the wisdom which comes from the multitude of counsel, and for definite and determined action, is clearly evident.

The American mining industry should here go on record as favorable to that solution of this problem, which is right, reasonable and just to the industry, to the employer and to the employee.

A law that strikes at the life of the industry will be a calamity.

A law that does justice to employer and employee, that operates, and compensates, without delay, friction or loss, will be a blessing.

The Explosion at Bruceton Mine

By R. Dawson Hall

An endeavor will be made in this article to treat the tests at the Bruceton mine in a somewhat more detailed manner than was attempted in the short description by J. T. Beard in the last issue. This article is to be regarded as supplemental only to his work and where details are missing, they can be supplemented by a reference to Mr. Beard's description.

The experimental mine is an honor to the Government's Bureau of Mines. Here are provided natural conditions, here all the conditions of actual work can be not only simulated, but actually reproduced. If a mine explosion occurs here, no specious critic can say, "You can do these things in a cylinder of boiler iron, but can they be done in a real mine?" The action of an explosion is a complicated thing; it can only be followed to its conclusions by actual observation in a mine where all the conditions prior to the explosion can be accurately predetermined—what doors were shut or open, what shot blew out, what powder was in it, how it

The Bruceton tests clearly develop the fact that under some conditions, an explosion may follow the return airway. The most clearly marked evidence of pressure was seen in a dusty part of the intake where there was a curve in the path of the explosive current.

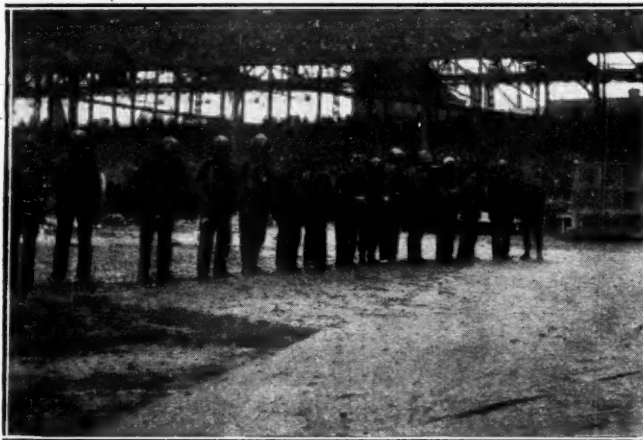
crosscuts connect it with the parallel airway to the left. The main gangway is open and unobstructed from end to end. The ends of both headings are 70 ft. clear of the last crosscut. The

bridge Scientific Instrument Company, of England, with pressure recorders which will continuously record the side pressure of the blast as it passes, showing on a chart, which revolves on a drum, the pressures at every interval of time. At these same stations are set wires from each side of the heading connected together across the roadway by a guncotton tie. This guncotton tie is burned by the blast as it passes so that an electric circuit is broken and the time interval is measured in the observatory on the hill.

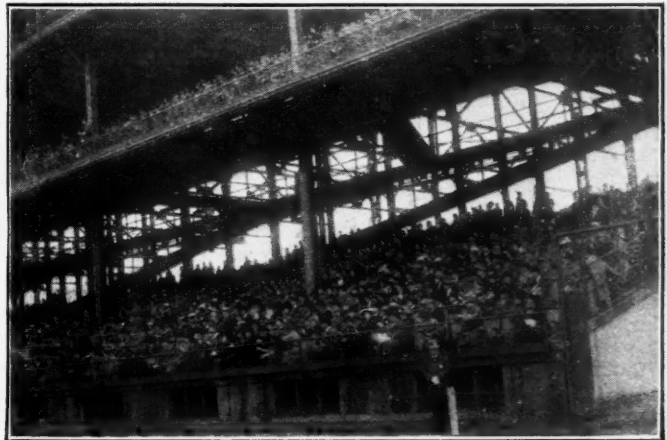
In the airway, lying left of the main heading a sandbag stopping from 6 to 8 ft. wide, was piled at the edge of the oblique gallery. At the time of the visit two heavy canvas stoppings lay across the first crosscut, the second was completely filled with sandbags for 8 ft. of its length, the third, that is, the most remote, was open.

THE STEEL DUST GALLERY

The steel dust gallery is as shown. It is made of half-inch boiler plate and is



HELMET MEN READY TO DEMONSTRATE RESCUE WORK



SHOWING PART OF THE CROWD AT THE SAFETY DEMONSTRATION

was stemmed, what gas was present, what humidity prevailed and what air current was passing. Here stoppings and overcasts can be erected and their strength determined. One factor after another can be eliminated, till the basal actuating impulses of an explosion can be laid bare and their relative importance determined. No work of others can be duplicated here, for there is but one Bruceton. It will set the standards for all future work, until like mines are installed elsewhere.

GENERAL DESCRIPTION OF MINE

Bruceton is situated thirteen miles south of Pittsburgh, on the Baltimore & Ohio railroad. The Bureau has there a mine, illustrated in the accompanying cut, which shows the whole development of the mine up to date. The main heading extends 715 ft. from the mouth. Three

mine is faced immediately by a small spur of hill so that the flying debris resulting from an explosion is stopped before it can travel far. Fortunately, Bruceton mine has rural surroundings and no harm is likely to result from the spectacular explosions.

The main portal of the Bruceton mine is of concrete, well reinforced so that it can withstand all manner of stress, including upward and outward stresses which, in the design of most mine approaches, is not considered. The foundation is carried down to the Pittsburgh limestone, which lies about 5 ft. below the Pittsburgh coal. As shown, the concrete lining extends about 240 ft. in from the portal of the main tunnel.

THE RECORDING CHAMBERS IN THE MINE

On the left-hand side are two instrumental chambers, equipped by the Cam-

102 ft. long and 6 ft. 4 in. in diameter. Beyond this typical explosions gallery is a movable section of 20 ft. followed by a 20-ft. concrete section covered by heavy plank and loaded down with dirt, so as to make it less likely that the steel section will have to bear strains beyond its strength. For about 200 ft. beyond the explosion door section, the gallery is extended underground to meet the airway. This 200 ft. of gallery is built of reinforced concrete. Two instrument chambers are set in the sides of this gangway, but they are not equipped with instruments, as funds at the disposal of the Bureau do not permit it.

VENTILATION OF MINE

There is a small blower fan near the steel gallery. It is a 36-in. Sirocco fan with 20-in. blades and was delivering 4000 to 5000 cu. ft. per min. at the time

the guests of the Bureau visited the mine, though it is competent to produce much more. A light corrugated-iron building covers the fan, so light that its destruction is assured whenever an explosive blast occurs. It may be added that the steel gallery was closed by a door and two light wood doors covered the opening to the airway though the large sandbag stopping further in made them useless.

THE INSPECTION OF THE MINE

The visitors went in at the portal of the main heading and by the light of electric lamps passed on to the end. On either side were seen shelves, which were really mine rails, set on edge measuring $2\frac{1}{2}$ in. by 4 in. These were supported by bolts projecting from the concreting or

AN IRKSOME DELAY IN THE PROCEEDINGS

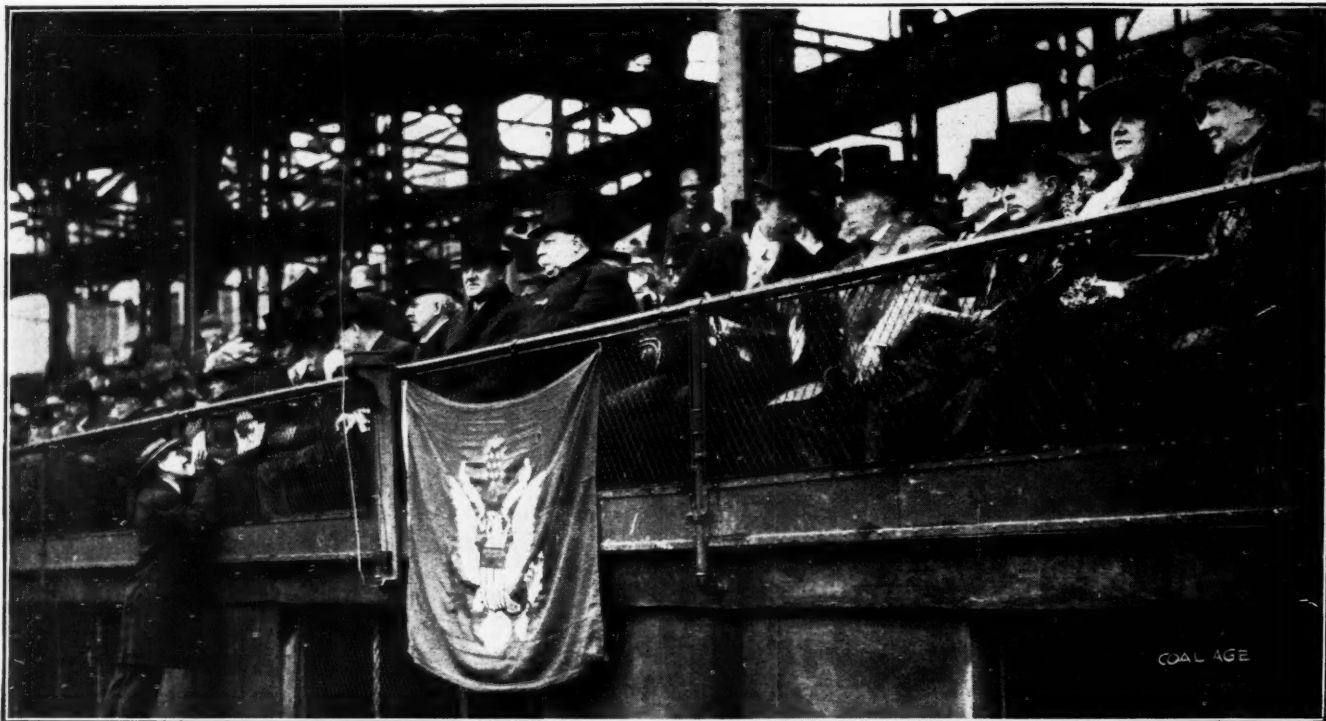
The visitors were disposed on the hill back of the mine so that they could see the portals of the main heading and of the steel gallery. The location was not favorable as the rain had made the newly planted wheatfield undesirable for walking.

One shothole was charged, it appears, with 2 lb. of FFF blasting powder, with a tamping of 6 in. of fireclay, the whole being set within an inch and a half pipe to insure a blownout shot. The men left the mine and the circuit which was expected to fire the shot was closed. Nothing resulted; not even the sound of a shot could be heard. The miners of the Bureau again entered the mine and con-

necting the wires of the detonator to discover if the lead wires were short-circuited. In the hurried work of the last few days this feature was overlooked. A new circuit was then laid into the mine and this time, to make assurance doubly sure, the last hole was charged and the three holes connected in parallel.

THE EXPLOSION

There was no failure that time; all three exploded together, as has since been learned. A burst of devouring flame enveloped the little strip of woods, burning leaves at the top of the highest trees. A loud report, heard over five miles deafened the hearers, and a rain of sandbags, planks, shelves and what not, ascended 50 ft. in the air where they could be



PRESIDENT TAFT; GOVERNOR TENER, OF PENNSYLVANIA; SECRETARY OF THE INTERIOR FISHER, AND DOCTOR HOLMES
VIEWING THE NATIONAL MINE SAFETY DEMONSTRATION IN PITTSBURG

the coal as the case might be. They were covered by dust but it did not appear that there was much dust to be seen. The floor was clean. In fact, there was only 1 lb. of coal dust to the foot-run in the heading. At the end of the gangway, three holes had been drilled in the coal. Each hole was large enough to hold a $1\frac{1}{2}$ -in. pipe. The holes were drilled about 3 ft. above the floor in a horizontal line, and extended 4 ft. into the coal.

The concreted portion of the airway entry and of the oblique gallery had shelving of like character to that in the main entry, but the dusting only ran $\frac{1}{2}$ lb. to the foot-run. No dust was distributed in the steel section. Some dust holders of the bookcase type ("transverse shelving") were put in the first crosscut between the main entry and its airway.

Another line of wires with another shothole of like charging, and came out and gave the signal. Another moment of tense suspense—and nothing resulted. The people were wet and cold and they were afraid of missing the train, and considerably over one-half, among whom were many, including the helmet men, who had come hundreds and thousands of miles to see the explosion, left the field.

It was the opinion of the Bureau officials that there was a short-circuit or a grounding due to the trampling of the people who went through the mine. The wires were only properly guarded where set in a pipe within the concrete and were not protected against injury where the headings were not cemented. No test apparently was made before con-

necting the wires of the detonator to discover if the lead wires were short-circuited. In the hurried work of the last few days this feature was overlooked. A new circuit was then laid into the mine and this time, to make assurance doubly sure, the last hole was charged and the three holes connected in parallel.

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plainly seen in the brilliant glare. The flame crossed the ravine in front and licked up the vegetation for a distance of 200 ft. A mine car, with its light weight of gravel, weighing about 2000 lb., stood about 20 ft. from the mine. It was lifted off the track, thrown bodily over the rock dump; it somersaulted several times, and struck the ground 200 ft. from the mines to make two more complete somersaults clear of the ground before it lighted with its wheels solidly embedded in the sod. Another car, with its load of coal, weighing two tons, was 75 ft. from the main entry and was lifted off the track and moved 20 ft. The fan house was demolished and the explosion relief-section unroofed. The sight of these missiles barely 50 ft. away and 50 ft. above ground warned the people to run and,

though no one was frightened, there was a politic retreat in which at least one man was knocked down.

AFTER THE EXPLOSION

A rough survey was made of the outside, the openings were closed up and the mine left for the night. A later in-

depositing what it had and finding no more. The unused "bookshelf" dust holders in the face of the airway were standing almost without distortion, though built in a way that makes them easily deformable.

To return to the blast passing out at the main entry, it passed the second

THE CONCRETE TUNNEL IS SEVERELY CRACKED

At the point where the blast made the turn to the oblique gallery the force was perhaps the most apparent. In concretizing the tunnel every effort was made to put the grout up to the roof so that the concrete would be in perfect contact. This was not always successfully accomplished, with the result that both in the explosion of the 24th and 30th, there were places where the concrete lining was lifted and badly cracked. One big crack showed at the sharp angle where the right side of the airway and the left side of the oblique heading intersect, using right and left in the sense of an observer going to the outside. In this crack a plug of wood was so forcibly driven it could not be pulled out. The concrete had evidently been lifted and in settling again had retained in place, not only this piece of wood, but some pieces of bag and twine as well. In one place the reinforcement was disclosed.

PRESSURES AND VELOCITIES

At present writing it is not known what pressures and what velocities were reached. It will take some time to ascertain these, as they demand some careful calculation, but in the explosion of



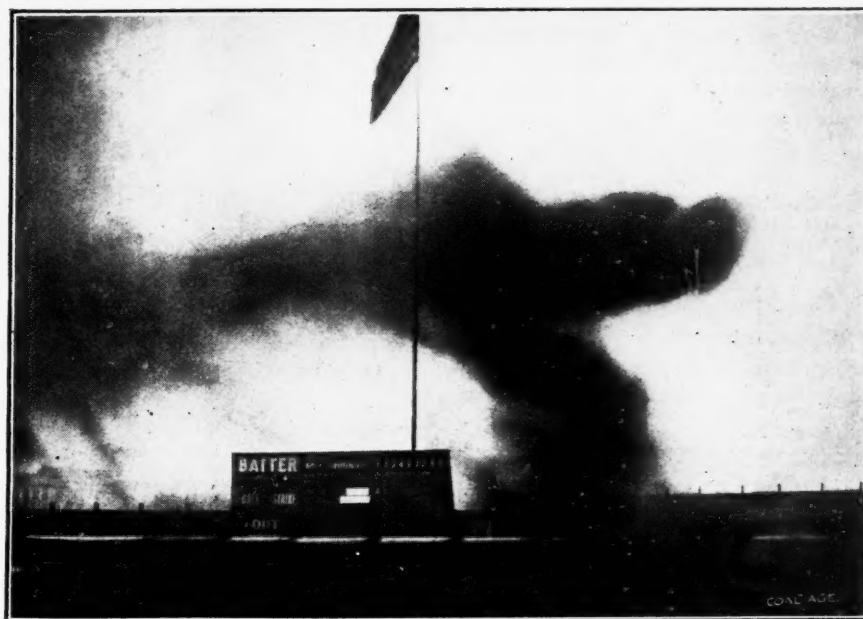
WAITING FOR THE COAL-DUST EXPLOSION IN BRUCETON MINE

vestigation shows that the stopping in the airway was entirely removed and blown out through the doorways, the wood doors swinging open without injury. The sand bags were found strewn in the mouth of the airway.

It must here be stated that the fan blew air directly into the steel section. This air passed up the oblique gallery to the parallel airway, up that heading to the last crosscut, and thence to the main heading and out. The shots, therefore, were fired into still air, the blast having to travel 70 ft. before a current of air was met. The explosion appears for the most part to have followed the return current. It was here that it had dust to feed on. There was no dust in the parallel entry, inbye of the first crosscut. Nevertheless the explosion crossed over to the airway at the inbye crosscut. There was evidence of coking of dust on both sides of this connecting airway and the coal had a bright silvery metallic luster in places, very different from the black luster of the unaffected coal, and strongly contrasting with the dull-looking face where the coal had been exposed to smoke.

THE FIRE DIES IN THE INTAKE

Though there was a small fall of draw slate in the airway, there was no evidence of violence between the first and last crosscuts and it is probable that the blast soon died out on the intake as it had little to feed on, soon burning or



SHOWING COAL-DUST EXPLOSION IN FORBES FIELD

crosscut without disturbing the stopping, but it blew through the first breakthrough where nothing but a canvas intervened. At the end of the concrete tunnel, the wires for shot-firing emerged and at that point a notch had been made in the rib. There was a plug set in the pipe at the time of the explosion and apparently a vacuum action removed the plug which was found lying loose in the notch just mentioned.

October 24, the time of its passage from the face of the main entry to the inbye instrument station was $1\frac{1}{2}$ sec., and the mean speed 406 ft. per sec. There is no question but that this speed was very much exceeded near the instrument mentioned and was not nearly reached at the point of ignition. Between the last two instruments the speed averaged 1900 ft. per sec., which accords well with the speed recorded by J. Taffanel and W.

E. Garforth, at the Liévin and Altofts galleries, respectively.

The pressure measured at the first explosion (that of the 24th) at the outbye station was 41 lb. per sq.in. That exhibited at the inbye station was over 50 lb., that figure being the record limit of the instrument. The pressure rose suddenly to that figure and it is likely that the actual pressure was much higher. As the first explosion was probably as severe as the exhibit explosion, and of like character, and did as much damage, it seems that the pressures must have been about equal on the two occasions. There will be several who will fail to accept such results as correct. The pressures surely should be greater than three atmospheres. It is probable that the pressures normal to the direction of the air current are small comparative to the pressures produced by the direct blast despite the general law of gas pressure, and it is possible that in the small fraction of time during which the pressure continues, the instruments lag in recording it, but it is not safe to make that statement with any assurance.

ACTION AT FACE OF MAIN GALLERY

There were long filaments of dust hanging from the roof and coal in the *cul de sac* beyond the last crosscut in the main entry. These were not visible further out. Evidently, the speed and force of the blast were not severe in the end of heading and probably the combustion itself lagged in the absence of a feeding current of air.

The deductions are as follows:

- (1) The explosion near the point of ignition did not do much damage. It is only putting it in another way to say that the speeds and normal pressures were lower at the point of ignition than at the end of the assisted travel of the explosion.
 - (2) The explosion followed the coal dust even where the coal dust was placed along the return.
 - (3) There was no evidence of extended explosive action toward the intake where the intake formed a dustless zone. But it must be remembered that the explosion probably entered the dustless zone with only about 70 lb. of coal-dust fuel. Had it broken through 200 ft. below into a dustless zone, the result might have been different.
 - (4) Gas does not need to be present to act as a medium to ignite coal dust. There was no gas in the Bruceton mine.
 - (5) The dusty intake induced at least as severe an explosion as the dusty return.
 - (6) Stoppings of unusual strength are needed for resistance to explosions.
- The explosion confirms rather than establishes what has long been held: that an explosion under favorable circumstances will follow the return, and under

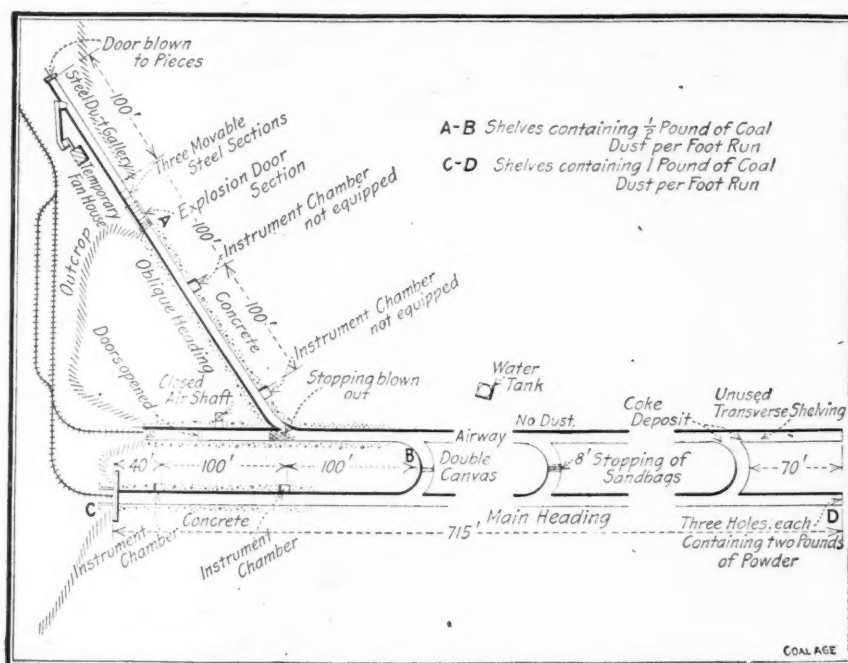
unfavorable circumstances will not follow the intake; that the explosion will not traverse a dustless zone in the absence of gas, especially when the dust content of the blast is low and, moreover, that the initiating point of the explosion is often accompanied with as little flame, as little force and as little speed as any portion involved in the catastrophe.

The intention is to install a Jeffrey fan, capable of giving a speed of current of 2000 ft. per min., and thus to test the action of high-speed air currents. This fan will be reversible so that the explosion may be toward the intake as well as toward the return.

It is not likely that the humidity of Monday checked the explosion in any way. The value of humidity is not to

Ammonium Nitrate Explosives

The consumption of ammonium nitrate explosives is steadily increasing both in this country and abroad, especially in the mines of Austria and Germany. Favorable conditions for the manufacture of these compounds also seem assured, since it has been demonstrated that nitric acid and various nitrates can be produced from the nitrogen of the atmosphere. For a time recently, fears were entertained regarding the production of all explosives except chlorates and perchlorates because of the impending exhaustion of the Chilean saltpeter deposits and the consequent rise in the price of nitric acid.



NEW MAP, SHOWING BRUCETON MINES JUST PRIOR TO EXPLOSION OF OCT. 30

dampen dust, but to keep it damp. Dust does not take moisture from the air readily, and it is fair to assume that the dust used was absolutely dry. It was prepared from Pittsburg coal, ground down so that 95 per cent. would go through a 100-mesh sieve.

It may be suggested, finally, that a favorable vantage point be selected for a view of the explosions and that all trees interfering with the view be removed. There is no question but what, if the experiments are continued, outraged nature will attend to the removal of the trees, but it would be better to forestall this result and make the view less restricted. If some arrangement could be made to provide a substitute for the mellowed mud of a recently plowed field, the thanks of the public would be freely accorded to the bureau for this improvement.

By ammonium nitrate explosives are meant those which contain ammonium nitrate as their chief ingredient, and not as merely a contributing addition. This class in common with other permissible explosives possesses qualities of great merit from the standpoints of safety in handling and transportation, and security against ignition of gas. Ammonium nitrate compounds are detonated only by a strong initial impulse, as compared to that required for dynamite, and are practically flameless. Unlike dynamite and some other permissible explosives, the gases formed are not as a rule noxious or toxic. In the event of their incorrect composition, however, these compounds may give off nitrous gases, which are particularly treacherous and far-reaching in their effects. The chief feature in this class of explosives is the suppression of the flame in blasting.

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This journal is interested solely in matters relating to the fuel industries, and is designed to be a medium for the free interchange of ideas, the detailed description of coal-mining practice, and the expression of independent thought calculated to benefit both operator and miner.

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COAL AGE

• The Hard Coal Trust

The case of the Federal Government against the anthracite coal-carrying railways, or the so called "hard-coal trust," has been reopened by the presentation of briefs before the Supreme Court of the United States. The Circuit Court, which tried this case last year, sustained the prosecution in only one of its several charges, and the whole case has been appealed substantially as it was originally presented.

It is generally known and acknowledged that the several defendant railroads do, in fact, control their affiliated coal-mining companies through stock ownership or otherwise; that a combination of their interests was effected by means of the Temple Coal and Iron Company, which the specified companies established as copartners; and that the practice of taking over the output of independent mines at a uniform rate is in general operation. Whether or not these matters, as well as those set forth by three other charges which have been entered, will be judged illegal and in restraint of trade, will doubtless soon be determined.

The effect of a decision adverse to the coal and railroad interests involved, is a matter of conjecture, but it is interesting to recall that at one time the conditions under which anthracite coal was mined and marketed were similar to those which prevail at present in the bituminous field, and that these conditions made for waste and industrial uncertainty, although they did not make particularly for low prices.

The present coalition of interests in the anthracite field was not conceived as an altruistic measure for preserving the country's resources from waste; but neither was it launched, full grown, with the object of squeezing an unmerited revenue from the public purse. Like many large industrial enterprises it has grown up gradually through efforts to meet existing conditions step by step. The small operator with a short-term lease wasted 1½ tons of coal for every ton sent to market. The large company, with ade-

quate capital and extensive holdings, has been able to reduce this waste by half.

A study of the conditions in the anthracite field by no means supports the idea that the public is being robbed. An immense amount of money has been invested in preliminary deadwork and costly equipment, all to the end that reckless spoliation and extravagant methods of mining may be eliminated. By this the public eventually profits no less than the operator.

It is, however, quite possible that the present desirable state of affairs in this field, from the standpoint of conserving its resources and ameliorating the conditions of mining, humanly speaking, as well as in a commercial sense, can be maintained with the industry on a basis more severely competitive than at present, and should the necessity arise, it is to be hoped that this will be the case. The large unit has definitely proved itself to be both necessary and desirable, but the amalgamation of large units may yet be shown to be neither.

The Preparation of Coal

There is little mutual comprehension between the anthracite and bituminous fields. Both are enlarging and developing without much help from the other. At times it seems as if there was more inspiration received in Pittsburg from Cardiff than from Scranton, so far is the northeastern field separated from the main Appalachian development. It is hard to explain why this should be.

In the matter of preparation of coal in the anthracite region, the large sizes are cleaned wholly by visual methods, the smaller sizes being cleaned by visual, superficial and physical processes. The superficial classifiers cover such separators as depend on the fact that slate slides on a chute with more friction and less speed than coal. The ability of clean coal to jump a gap into which dirty coal falls is due to the greater speed it attains on the chute, which lengthens its trajectory. Similarly the coal in the spiral picker runs so much faster than the

slate that its centrifugal tendency, so called, makes it rise up a slight incline and leave the inner spiral for the outer.

The only true physical process, which is based on the internal composition rather than the external appearance, is some form of washing device. Such devices in the anthracite region are used for all sizes from buckwheat to egg inclusive with diameters ranging from $\frac{1}{8}$ to $3\frac{1}{4}$ in. The coal of the anthracite region is not often subjected to chemical analysis, but to purely visual tests, so much slate and so much over-size or, under-size being permitted in the sample taken.

On the other hand, in the bituminous region, except for the washing of slack, there is never anything but a picking belt or table. Yet the test of the coal is always chemical as far as it is tested by any recognized method. Physical preparation more nearly approaches the chemical than any other. It alone considers the whole mass of the coal body and overlooks its outward appearance. Some pyrites is crystalline and is readily rejected, some is colloidal and looks harmless in comparison. It may be regarded as being in passable proportion, because not so easy to distinguish.

It would appear, offhand, that a coal to be visually tested like anthracite, should be visually prepared, and that a coal chemically tested should be largely physically prepared. Though in any case the combination of methods, ocular and physical, would be better than either.

Counting the Cost

The fact that the present agreements between operators and mine workers in both the anthracite and the bituminous coalfields of this country expire simultaneously, March 31, 1912, seems to be obtruding itself more and more on the public consciousness. From increasingly diverse and widespread sources come indications of awakening interest in this matter. Many who are more immediately concerned have had the fact in mind for a long time and doubtless, for some, it has formed the basis of conjectures and plans, during the greater part of the past six years. Recently, the union locals have been considering and formulating their proposed demands and the operators have been storing coal and taking other precautionary measures.

Without attempting to discuss the present status of the controversy, the probability of its ultimately developing into an actual and momentous issue, or the strength and attitude of either side in this latter event, it may be pertinent to suggest that the time to count the cost is preferably before and not after a conflict.

The cost of the Welsh collieries strike which lasted the greater part of the past year and terminated without a decisive victory for either side, has been estimated at \$15,000,000. Whether or not this figure is accurately determined is a matter of secondary importance in comparison with the obvious fact that the cost of such a strike is enormous.

Broadly speaking, the cost of an industrial struggle of this kind may be measured by the losses sustained, taking normal working conditions as a basis of comparison, and by the expenses incurred, which are, in a final analysis, productive of neither useful work nor a valuable commodity. To enumerate all of the various items which go to make up this total cost would be a difficult and intricate matter, so complex and far reaching are the interests concerned, but a few of the more easily apparent expenditures and losses may serve to indicate the magnitude of the whole.

Of prime importance to the workmen is the loss of their usual earnings. This is also, almost in its entirety, a loss to the various communities and the country at large since the cost of subsistence for the men and their dependent families during the period of enforced idleness, whether defrayed by the savings of the men themselves, the contributions of their confederated fellow workmen, or the extended credit of landlords and tradesmen, represents a reduction in the aggregate wealth of the country; and the increment of national wealth normally accruing from the miners' labor is likewise lost.

On the other hand, the owners and operators must inevitably regard with particular concern, the fact that the total amount of capital invested in the idle portion of the industry is deprived for a time of its usual and expected earnings. This applies not only to the mining operations, but also in a somewhat less degree,

to all the various transportation, sales and distributing interests which are involved, because the reduction in their expenses by no means corresponds to the reduction in the volume of their business, and because a large percentage of their capital, if not the entire amount, is dependent on this business for its earnings.

Then there are the many actual expenditures which from the standpoint of usual working conditions yield no permanent or valuable return. The maintenance of the organized executive, clerical and other forces of the various companies is at such a time largely a dead loss. Additional police protection is an important item of expense to both operators and State. The cost of employing firemen, pumpmen and other unproductive labor is considerable. But lacking these measures, the almost incalculable losses consequent upon drowned-out mines, abandoned machinery and the destruction of other valuable property must be taken into account; and at best, the impaired condition of plants by reason of disuse and neglect will represent no inconsiderable expense.

To the foregoing may be added a great number of other items, all more or less susceptible of being expressed in terms of dollars and cents, but whether so expressed or not, definite and substantial contributions to the total cost. The migration and emigration of the laboring element whereby organized forces of experienced workmen are broken up and disbanded; the lawlessness engendered by idleness and want; the baleful effects of strife, riot and bloodshed; the insidious degradation of the whole community; are a few such items.

Beyond doubt, if several hundred thousand men and several hundred million dollars are kept idle for any great length of time, the cost is bound to be prodigious. The important question then becomes, not how much this cost will be, but how may it be avoided. Nine years ago arbitration was scorned and scoffed at by many operators and a multitude of miners, but it has since been admitted to possess merits; and in these days of conservation, strikes and lockouts have come to seem particularly crude and wasteful means for the settlement of a dispute.

COLLIERY NOTES and COMMENTS

*Practical Hints Gathered Here and There, and
Condensed to Suit the Busy Reader*

Experiments have shown that a 10 per cent. greater weight of briquets than of lump coal can be stored in a given space.

The motto of the H. C. Frick Coke Company should be the guiding principle of all mine foremen: "Safety the First Consideration."

The increase in temperature proportionate to the depth attained in deep mines is due to the secular heat of the earth, the presence of highly pyritic or carbonaceous shales, or the percolation of warm springs.

Hoisting rooms and power plants should be well supplied with metal cans for holding greasy, dirty waste. They should be emptied frequently as an accumulation of such material is a possible source of fire.

Experience has shown that non-mechanical storage plants are economical only for small installations since their cost of operation and maintenance is high, the amount of breakage is large and rescreening is difficult or impossible.

When quick-burning briquets are wanted remember that large briquets are harder to light than small ones, and that inorganic binders tend to make the briquet slow to fire. An increase of the inorganic matter in the slack also retards combustion.

Where there are dangerous accumulations of gas, in mine workings or the gob, which cannot be removed by the air current, boreholes put down from the surface will allow it to escape, thus rendering safe what would otherwise be dangerous working places.

Coal companies should furnish all of their mine superintendents with a classified monthly list of all mine accidents occurring in company mines; this is an inducement to greater forethought and care, the avoidance of similar accidents and the preservation of life.

With longwall mining, 6-yd. packs on either side of the haulageroad will add greatly to the safety of the mine and the workmen. Generally speaking, all packing should be kept within a distance of not more than 6 yd. from the face. Haulageroads should not be more than 30 yd. apart.

Signs, warning of danger, or suggesting correct mining practices, printed in differ-

ent languages, and hung in conspicuous places in the mines, boiler rooms, pump rooms, and at the entrance of the mines are silent reminders of ever present danger which confront the ignorant or careless workman who is responsible for the high death rate of the American mines.

The reason that explosions in bituminous mines are more apt to occur in late fall and winter than any other season, is because the mines are drier in winter. Cool air contains less moisture than warm air, the warmth of the mine raises the temperature of the entering, cold, winter air, and as the air becomes warm, it absorbs water, thus taking up the moisture and depositing it outside.

In gaseous mines, where the system of ventilation is of the utmost importance, remember that the longwall system of mining greatly simplifies ventilation, as most of the air passes along the working faces in one continuous current, diluting the gases as they are given off. The absence of sharp turns and narrow passages reduces resistance and hence increases the efficiency of the ventilation.

The importance of immediately investigating the appearance of smoke in a mine is well illustrated in the Delagua, Colo., mine fire. Smoke was noticed in the return end of the crosscut, but the driver who first saw it did not stop to investigate; had he done so the lives of 79 men who perished might have been saved. Impress on all underground employees, the importance of instantly investigating the slightest indication of fire.

Calcium chloride is vastly superior to common salt for the treatment of dust on roadways or in rooms, as salt itself has no affinity for moisture, although the small amount of magnesium chloride contained in it attracts a slight amount of moisture, which is thrown off at every small rise in temperature above normal. On the other hand, calcium chloride holds moisture tenaciously even at a temperature above 350 deg. F. It is used in the tube system of New York City to reduce the dust and moisture.

Locked gates, placed at the ends of switchboards carrying high-potential lines, will prevent accidents, due to persons coming in contact with the uncovered conductors at the rear of the board. Rubber mats placed in front of switchboards are a means of preventing possible acci-

dents. All mine transformer stations should be surrounded by a strong fence. If the transformers are placed on a platform above the ground, the danger of shock, from coming in contact with a high-tension wire will be eliminated.

Engine rooms should be equipped with water taps located at the intake opening near the sheave wheel. Such taps so located would be of inestimable value in case of engine-room fires. In order to overcome the strong drafts that often pass through engine rooms and fan slight fires into disastrous conflagrations, a door should be erected in the cross heading which connects the engine room with the passing branch. During the absence of the engineers from the engine room this door should be kept closed.

Experiments made at Pittsburg show that ordinarily, coal dust to be explosive must have originated from coal containing at least 10 per cent. of volatile matter. Dusts with a high percentage of volatile matter, other things being equal, are more sensitive than dusts derived from low-volatile coals. With coals that do not easily yield their gases, large intense flames are necessary to start an explosion. Experiments made by M. Taffanel have clearly shown that anthracite coal dust will not spread an explosion, which fact seems to prove that it is the volatile portion of the dust and not the fixed carbon present which spreads explosions.

Figures, issued by the Federal department of commerce and labor, state that coal mining in North America, in the 20 years from 1888 to 1908, resulted in the loss of 29,293 lives or 3.11 for each 1000 men employed. From 1896 to 1906 the average death rate, due to accidents in the coal mines of North America was 3.13 per 1000 men. During this same time the rate in the United Kingdom was 1.29; in France, 1.81; in Austria, 1.35; in Prussia, 2.13. The yearly average of fatal accidents in the entire North American coalfield has been about 3000 persons. In 1908, 567 persons out of the total 171,185 employees of the anthracite mines were killed. From 1896 to 1908, 46.6 per cent. of all coal-mine accidents in North America were due to roof falls, 25.2 per cent. were due to explosions and 12 per cent. were due to mine cars. During 1908, 10 children of 15, 14 and 13 years of age were killed in or about coal mines.

EXAMINATION QUESTIONS and ANSWERS

To Encourage, Assist, and Instruct Those Preparing for Firebosses, Mine Foremen, and Inspectors Examinations, Selected and Original Questions Are Carefully Answered And Fully Explained

W. Va. Fireboss Questions

HANDLING MINE GASES

Ques.—(a) Which is the most difficult to remove from the mine—firedamp or blackdamp? (b) Why is this? (c) Which, in your opinion, is the most difficult gas to contend with in mining? Explain fully.

Ans.—(a) This depends on the density of the gas with respect to its location in the mine. Blackdamp (carbon dioxide) is most difficult to remove from dip workings, and marsh gas is most difficult to dislodge from high falls or the face of a steep pitch. (b) Because the heavier blackdamp tends to fall back down the dip nearly as fast as the air-current can remove it; and, likewise, the lighter firedamp (marsh gas and air) tends to rise on steep pitches and high falls almost as quickly as the current can dislodge it. A strong current well directed by temporary brattice is required, in each case, to sweep away the gas. (c) The most difficult gas to contend with in mining practice, when it is present, is carbon monoxide (whitedamp); because it may be present in dangerous quantity, and its presence not be suspected before it has produced fatal effect.

EXPLOSIVE MINE GASES

Ques.—(a) Name and describe the explosive gases usually found in coal mines. (b) Under what conditions do they become explosive and nonexplosive? (c) How are they generated in mines? (d) Where are they generally found and how can they be expelled from the workings? (e) What effect have these gases on the health and safety of the workmen?

Ans.—(a) The explosive gases found in coal mines are marsh gas, carbon monoxide, and sulphureted hydrogen. (b) These gases become explosive when mixed with air in the proper proportions; the explosive mixture, however, is rendered nonexplosive by the addition of sufficient quantities of such extinctive gases as nitrogen or carbon dioxide. Carbon monoxide is also nonexplosive in the absence of moisture (dry air). (c) Marsh gas issues from the pores of the coal and contiguous strata, in mines where it exists as an occluded gas. Carbon monoxide is produced by the combustion of carbon, in any form, in a limited supply of air, which makes the combustion incomplete; it is also formed, in some mine

explosions, by the reduction of carbon dioxide in presence of incandescent carbon or coal dust. Sulphureted hydrogen is formed in mines by the action of the air and water on the iron pyrites (sulphur balls) in some coal, or is liberated from mine water containing sulphur. (d) The several mine gases are found in those parts of the mine where they are generated in considerable quantities, or where they accumulate by reason of their density with respect to air. Marsh gas is formed in largest quantity in new workings and freshly exposed faces of coal, or on the falls in abandoned workings, and in rise workings or at the face of steep pitches. Carbon monoxide is formed in abandoned workings and poorly ventilated places where slow combustion is in progress, or shots have been recently fired. Sulphureted hydrogen is formed mostly in low, moist places or swamps where the coal contains much sulphur, and in the region of drainage sumps or pump lines. All these gases are removed from the mine by an ample and well distributed air-current. (e) Pure marsh gas suffocates by excluding oxygen from the lungs, but when diluted sufficiently with air, it produces no ill effects. Carbon monoxide and sulphureted hydrogen are both extremely poisonous, but fortunately do not often occur, in mines, in quantities to prove dangerous.

Interesting Questions

DUTIES OF A MINE FOREMAN

Ques.—What are the duties, in general, of a mine foreman?

Ans.—The duties of the mine foreman are to devote his entire time to the supervision of the operation of the mine of which he has charge; to personally direct every branch of the work; hire and discharge the workmen; inspect daily all ventilating, hoisting, haulage and pumping or drainage machinery and appliances. To inspect personally, at least each alternate day, as far as possible, all working places, airways, roads and travelingways in the mine, and make the necessary air measurements to determine that the required quantity of air is passing in each split; to remove, or cause to be removed, all dangers as quickly as such are reported to him or found to exist in or around the mine. In case such danger cannot be promptly

removed, it is the duty of the mine foreman to see that suitable danger signals are placed in conspicuous places so as to warn all persons of the danger; or, if necessary, to withdraw the men whose lives or health would be endangered. In case of serious accident to workmen, the mine foreman must attend to their prompt rescue and removal, and see that the injured receive proper first-aid treatment and care till medical help arrives. He must report such accidents to the district mine inspector, attend all inquests, and give the testimony required.

HANGFIRES IN ELECTRIC BLASTING

Ques.—Explain the three conditions that may cause a shot to hang fire in electric blasting in mines.

Ans.—Hangfires are less frequent in electric blasting than in blasting with fuse. They have occurred, however, with fatal results in many instances. There are different kinds of electrical fuses, chiefly classified as (a) *low-tension* fuses, in which the two terminals embedded in the exploding cap are connected by a metallic bridge of fine wire; (b) *high-tension* fuses, in which the terminals are bridged by a combustible having a conductivity such as to produce a somewhat high electrical resistance. It is possible when no detonator is used to explode the cartridge, that a hangfire may occur, owing to the powder being damp.

A misfire may result from the detonator not being of sufficient strength to explode the charge; and this may even cause a hangfire if the explosion of the cap has set up a deflagration of the dynamite, which may shortly detonate the charge. The same deflagration, followed by the detonation of the charge, may result from a damp, or poorly mixed, or insufficient priming. Bad electrical connections may delay the explosion by allowing the passage of a current of too feeble intensity, generating only heat enough to warm the bridge, and requiring a longer time to explode the charge.

The three conditions that may cause a shot to hang fire may be stated, therefore, as follows: (1) The powder used in the primer may be sufficiently damp to smolder or burn slowly. (2) The cap used to detonate the charge may be of insufficient strength. (3) Poor electrical connections may allow of the passage of a too-feeble current.

SOCIOLOGICAL DEPARTMENT

A Bureau Devoted to the Welfare of Miners Everywhere, and Especially Designed for the Betterment of Living Conditions In Mining Communities—COAL AGE will be Glad to Print Any Suggestions or Ideas of Value to this Department

Y. M. C. A. Progress in the Bituminous Coalfields

It is now a little over nine years since the State Y. M. C. A. of Pennsylvania sent C. L. Fay into the bituminous coalfield to organize the Y. M. C. A. work. Greensburg was chosen as headquarters from which to launch this new enterprise. From the very beginning it met with hearty and immediate response upon the part of most of the operators and the men.

At first the volunteer form of organization was adopted, and 25 or more of these associations carried on a creditable work, the stronger ones finally develop-

Washington, Du Bois and Clearfield secured their own buildings and Uniontown has a fund subscribed for a large building to be erected in the near future.

At the time the mining department was organized, none of the associations in this field were attempting any work for the miners. But today there is hardly an association in the whole bituminous coalfield that does not include in its program some special work among the mining population. Among these are Pittsburg Central, Johnstown and Washington.

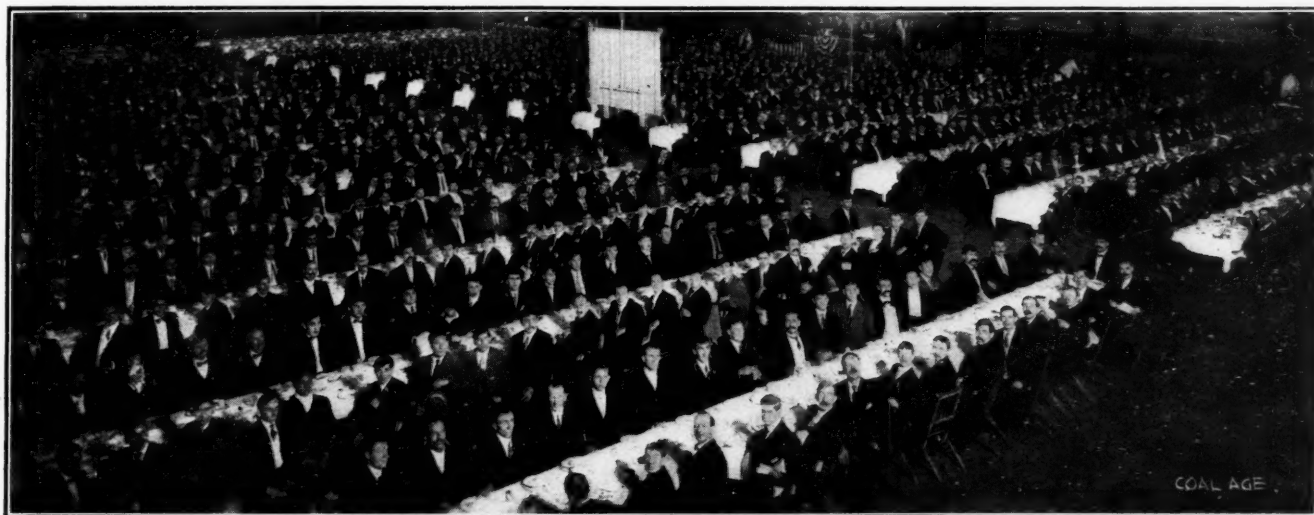
MINING CLASSES AND INSTITUTES

The bituminous committee, through its secretaries, is reaching scores of small-

the individuals themselves and to the whole mining fraternity will never be fully written. For who can tell what new ideas, ambitions and resolutions have been let loose in the minds and souls of these honest, industrious, hard-working foreign miners.

FIRST AID

Take the first-aid work. In 1907, the Latrobe association began a regular monthly series of first-aid lectures, followed by demonstrations. Then they became a regular part of the monthly program in the local mining institutes. The mining department of the State Y. M. C. A. was, therefore, the pioneer of first



BANQUET OF WILKES-BARRE MINING INSTITUTE

ing into regular or secretarial associations. Among these were Greensburg, Punxsutawney, Latrobe, Monongahela, Ebensburg, Somerset, Myersdale, Export, South Fork, Patton, Barnesboro, Fayette City, Winburne, Philipsburg and Windber.

NEW BUILDINGS

Some of these associations now own their own buildings or have the money with which to erect them. The plant of the association at Punxsutawney is valued at \$50,000, Ebensburg, \$35,000, Fayette City, \$12,000, while Greensburg has had a bequest left to it of approximately \$200,000. Indiana and Scottsdale have recently conducted campaigns, securing \$50,000 each. The Latrobe and the Monongahela associations are looking forward to the time in the near future when they will also have their own buildings. In the last nine years Connellsville,

er towns, where no large buildings have been erected or even association rooms provided. This is done by organizing mining classes and mining institutes, which meet in the school houses or hall or some place provided by the coal companies. It would not be overestimating if we were to say that no less than 600 men hold certificates today as a result of the classes organized through the help of the mining department of the State Y. M. C. A. Hundreds more have been greatly benefited and helped through the annual and monthly institutes. Some of the best papers that have come to our notice in recent years had been prepared and read by members of the Y. M. C. A. mining institutes.

Hundreds of non-English speaking men have been gathered into classes and taught English by means of the Doctor Roberts system. What this has meant to

aid in the bituminous coalfield. It paved the way and made possible the now sweeping interest in this humanitarian work so forcibly signalized at the first-aid demonstration at Forbes field, Oct. 31, 1911, by the Bureau of Mines and the other coöperating agencies.

The present board of management is composed of John M. Jamison, Greensburg, Penn., chairman; L. C. Walkinshaw, Greensburg, Penn., recording secretary; Fridolin Miller, Greensburg, Penn., treasurer; other members are: George F. Huff, Greensburg; J. C. Stineman, South Fork; L. B. Huff, Greensburg; E. M. Gross, Greensburg; E. S. Wallace, Pittsburg; Austin Blakeslee, Du Bois; R. H. Jamison, Greensburg; A. P. Cameron, Irwin; F. C. Keighley, Uniontown; F. R. Lyon, Somerset; A. W. Calloway, Punxsutawney; F. M. Semans, Jr., Uniontown; W. W. Keefer, Pittsburg; W. R. Cal-

verly, Windber; Thomas B. Dilts, Greensburg, and E. E. Bach, field secretary, Uniontown, Pennsylvania.

Every coal company, every individual connected with coal mining, as well as everyone interested in the welfare of humanity in general, ought to encourage this unselfish and unexploited form of social service.

The Company House

The words of an acquaintance occur to me in this connection: "I arrange always to be in debt, so as to stimulate steadiness and frugality. When I can make a first payment on a bond or a house I do so, knowing that the instinct to save what I have will prompt me to prepare for the following instalments." He was a quiet man, no roisterer nor slave to social pleasures, probably as well known as any mining man in the anthracite region; but while it was true of him that debt steadied

men are listless and their work is irregular; if the company waits for the town to grow, the increment of tonnage is painfully slow and the profit distressingly small.

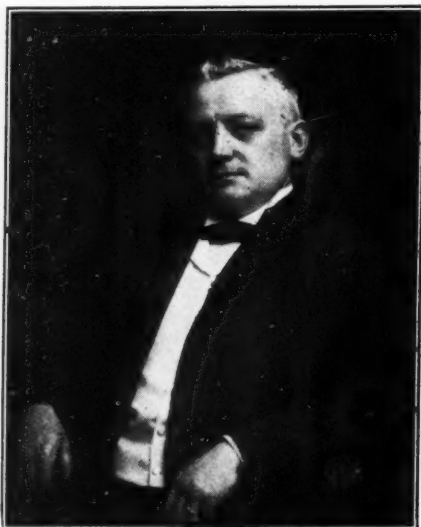
On the whole it does seem that the better plan where there is a village nearby is to put the money often spent in company houses into the plant. Or again it is better where good rates can be secured to haul the men at a low figure several miles over the railroad to their work as the Consolidation Coal Company is doing at some mines in Maryland. The advantages of life in the larger villages, in no "one man's town," are always appreciated and preferred to life in the company town. In the neighborhood of Sligo, Rimersburg, Oak Ridge, New Bethlehem, Du Bois and Reynolds-ville, Penn., to mention a few instances coming readily to mind, men frequently travel three miles, to and from their work,

propinquity to his operations, the men to be employed therein. Moreover, the landlord must to a degree supervise the actions of the tenants in his houses and on his property.

His difficulty resembles in many ways the still unsolved domestic problem. The best workers refuse domestic service because it involves a dominance in matters which the individual regards as his inalienable personal rights; the householder must, however, retain such dominance because of the close personal association resulting from such service. If a town is built it must be policed in some sense by the operator, and when it is so governed, it is a corporation town and in some ways not desirable.

DIFFICULTIES RESULTING FROM THE SALE OF SMALL HOLDINGS

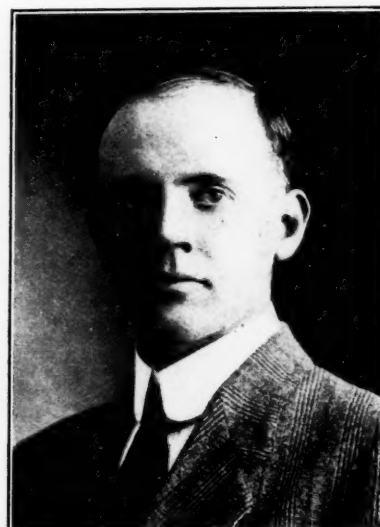
It is possible to build a town and sell lots around it with restrictions on the



C. E. TOBEY, PRESIDENT SCRANTON
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Y. M. C. A. MINING INSTITUTE



J. H. DAGUE, DIRECTOR ASSOCIATION OF
SCRANTON

and balanced him, it is even more true of men of wild habits who are lacking in self control.

The company house in the company village, with company streets and a company store, does not furnish the needed opportunity for the expenditure of money in desirable ways. The man, who can buy no land, who can build no house, who expects to move any day, has no incentive to buy except to gratify the impulses of the moment. In fact, to him money loses much of its real value. He desires to get away, if only for a day from that undesirable place. He does not call it a home.

THE PROBLEM OF THE COMPANY HOUSE IS AN OPEN ONE

It must be confessed that it is a problem what the coal corporations can do toward the housing problem; if the companies build their own dwellings, the

solely because life in those larger villages appeals to them. Some walk, some drive. In the last two cases mentioned, longer journeys, yet, are made on street cars.

The incentive to save, to form part of a self-made, self-advancing community provokes sobriety, steadiness and frugality. The presence of sober, steady, frugal men is a nucleus around which others of like kind can be gathered.

THE DIFFICULTIES SURROUNDING THE COMPANY TOWN

The dominant note of the company town is coercion. It is not the dominant note so much because of the frailty of the operator but because coercion becomes almost necessary under the conditions obtaining. He must, for the safety and success of the community, keep out speakeasies and questionable characters. He must assume that dominance which inevitably arises from keeping, in close

sale of liquor, but these restrictions, as far as speakeasies are concerned, are largely inoperative. A freeholder cannot be ordered out like a thirty-day tenant and a case against a man running a speakeasy for foreigners only, is hard to prove. Moreover, the company consenting to sell lots is then suspected of desiring to sell them and of discrimination in apportioning work to purchasing leaseholders and, even if discrimination is not desired, the denunciations of the company by a purchasing leaseholder on his discharge would be reëchoed by the nonpurchasers till discrimination unflinchingly resulted.

And if the corporation builds a little town and lets others sell to the company employees, the corporation may be hampered in future unforeseen development; the presence of speakeasies and saloons may embarrass its operations and the time may come when the preference for

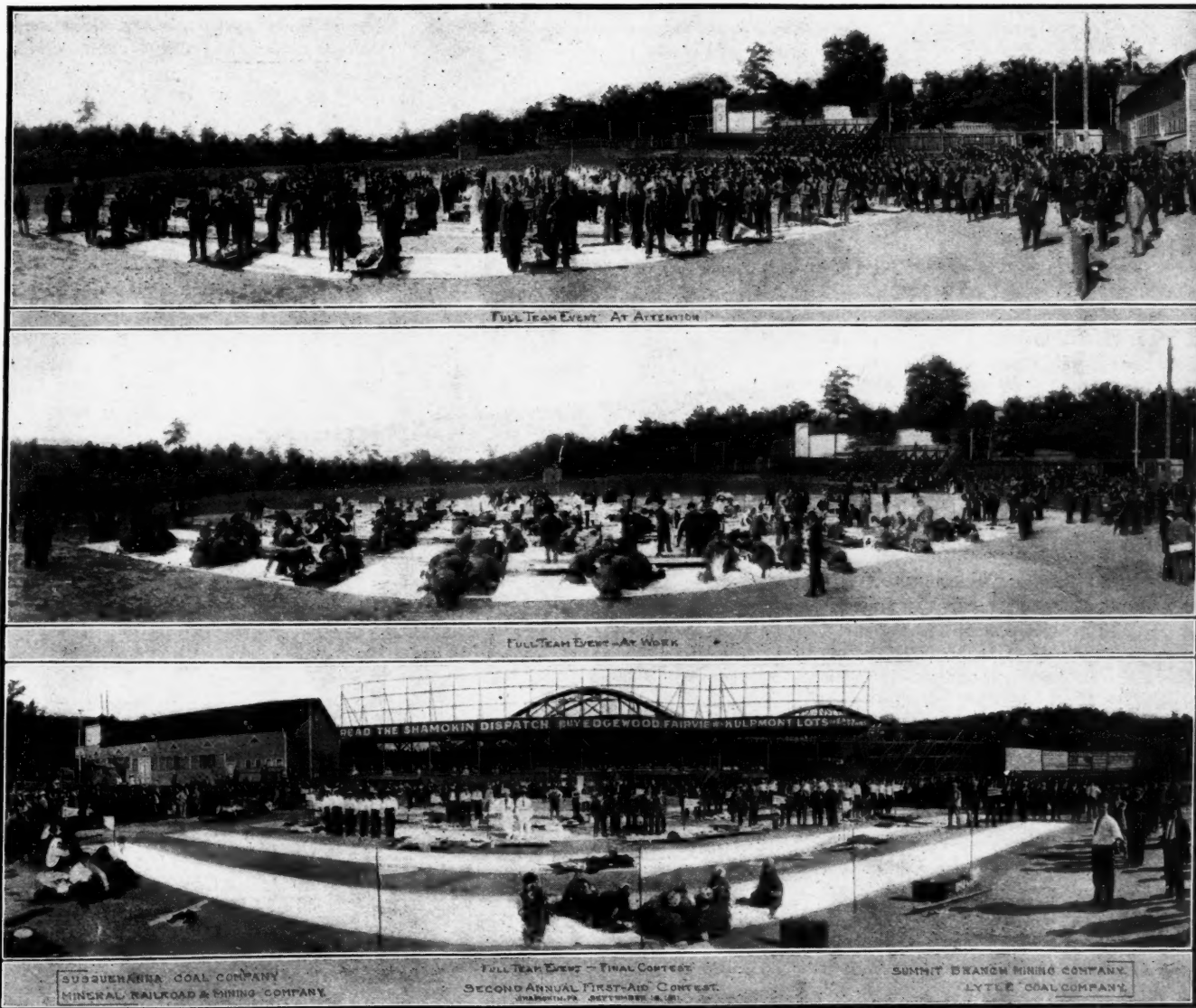
noncorporational houses, shanties or huts, may make the company regret it ever built a single tenement. To keep its tenements full, discrimination naturally results.

On the whole, it seems that, whether saloons are few or many, speakeasies thriving or nonexistent, despite the discouragements of hampered development, the company usually gains by not dabbling too freely into the private life of

as the general purchasing power of his earnings is concerned. Another point to be considered in the wage question is the "lost time" of workmen. A man who receives \$5 per day and works half of the time is only a little better off than the workman who is employed full time at half the wage. Such modifications of the wage question have greatly puzzled economists and statisticians in their efforts to ascertain and compare average

1860, the hours of labor have been reduced 10 per cent.

The workingman today demands not only the necessities of life, but something beyond,—a surplus which shall go to the support of his spiritual nature; that is, not merely sufficient food, a dwelling and a variety of clothing, but opportunities for reading, amusement, recreation and, above all, a better chance for his children. He desires to surround



ANTHRACITE FIRST-AID TEAMS IN COMPETITION AT SHAMOKIN, PENN.

its employees, even in the most disinterested ways. The best of men dread the eye which follows them night and day.

Labor and Wages

The most interesting question in connection with employment of labor is whether or not wages are increasing. A man may receive today \$20 for a week's work, with prices of food and commodities high. The same workman 20 years ago receiving \$15 per week, with low prices, might have fared better, so far

wages today with earnings of workmen in the same industries years ago.

The percentage of increase of wages in general, from 1860 to 1891 is shown by the report of the Senate Committee on Finance, the wages for 1860 being considered as normal, or 100. On this basis, wages in 1840 stood at 87.7, 100 in 1860, 152.4 in 1866, 160.7 in 1891. Since 1891 there has been a steady increase so that at the present time the average of wages for all occupations is higher than at any time in the history of this country. It is also true that since

himself not only with necessities and conveniences, but demands a fair proportion of the luxuries of life; and every right-minded person must admit that this modern demand of labor is a proper contention.

The assumption of the present-day workman that he is more than a human machine is based on the soundest of democratic principles; the resulting change that is gradually taking place is sure to make wage-earners (skilled and unskilled) more valuable and intelligent citizens.

DISCUSSION by READERS

*Comment, Criticism and Debate upon Previous Articles,
and Suggestions from the Experience of Practical Men*

Strength of Stoppings

M. Taffanel, the French coal expert, makes the statement that explosions travel more frequently by intake airways than by returns and the Bureau of Mines asserts that the most usual direction of an explosion is toward the intake. I desire to point out later how apparent exceptions may possibly be regarded as mere exemplifications of the rule they appear to refute.

In the accompanying diagram of a mine in which the headings are enlarged, the arrows show the course of the air in circulation before the explosion. I have shown the seat of an explosion as the end of the left-hand face heading. The explosion is in a split of comparative unimportance so that the case is somewhat extreme, but the principle is not affected by that fact. The blast of exploding gases will pass out along the gallery from end to end, opposing the intake air and being prevented from entering the other airways. The causes, preventing the entrance to other airways, are two. At the mouths of some headings, the resistance of the stoppings is the excluding factor, at others the air is receding from the blast, which for that reason shows only a moderate desire to enter. The blast regards the latter as returns and not intakes. In the sketch the airway affected by the blast is hatched with fine diagonal lines.

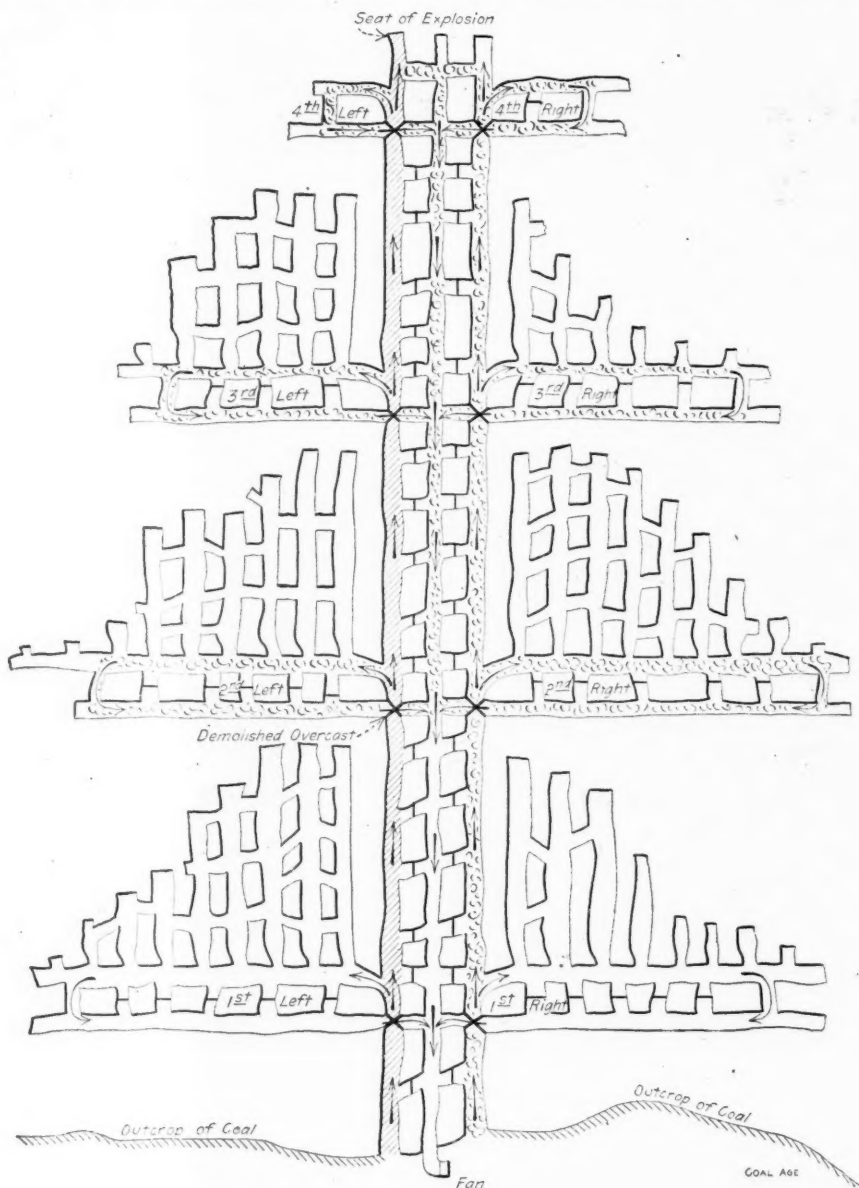
A RETURN MAY APPEAR TO AN EXPLOSION AS AN INTAKE

What results if an overcast or a stopping blows out? Let us suppose an air-bridge blows down at the 2d Left. Immediately the explosion meets the return air current at the overcast and regards it as an intake, for it is an approaching current. The whole of 2d Left is involved and that fact is indicated by the volumes of smoke curling therein in the illustration.

But as the overcast is completely demolished the explosion can travel toward the return airway. It does not prefer to do so, according to the best authorities, but it does so travel for a short distance. Here the distance is about 50 ft., certainly not enough to reduce appreciably the explosive force. Reaching the return, it cannot pass far to the right because the air is receding, but on the left the return air is approaching and the explosion views it as an intake and runs back with increasing violence

perhaps to the airways from the 3d and 4th Left and 3d and 4th Right. It has previously faced, of course, the return of 2d Right. The explosion spreads up the returns and then up the intake airways of all these headings be-

And these considerations may well justify the belief that airways are sometimes affected by two or more explosions of contrary sign. Not only may explosions in embryo create more violent explosions at foci along their path, creat-



SUGGESTED COURSE OF AN EXPLOSION WHICH OPPOSES INTAKE

cause in all, the air current is contrary in every case to the blast's forward motion. In the illustration they are shown full of smoke. To make the illustration plain, the smoke has been confined to those headings where the blast opposes the air current, but as a matter of fact it will spread somewhat beyond those limits.

ing backward blasts over already traversed areas, but the explosion may travel around a circuit and arrive on a crossing of its former path and spread the debris anew so as to make the ascertainment of the initial focus well nigh impossible.

The principal value of strong stoppings is the fact that they preserve in-

violate the integrity of splits and so prevent the extension of an explosion. Had none of the stoppings blown out it is probable that the hypothetic explosion would have been less general and involved little more than the main-left gangway; it is certain the main-right gangway could not have been affected.

It is frequently thought that the value of a strong stopping is the probability of its preservation through the catastrophe to aid in rescue work.

But there are periods after an explosion when the safety of the men in the mine may be actually jeopardized by ventilation. It was the lack of ventilation which proved the one source of hope to some of the men entombed in the Cherry mine. Stagnant air was better to them than the air actually circulating. It must not be thought that if it were not for their help in reducing the area covered by an explosion, I would advocate weak stoppings, but I would point out that their main value is their power to fence around a blast so as to keep its devastation from involving the whole mine.

I hope you will publish this article despite the fact that it views the statement that the "air travels back on the intake" in the sense that it opposes the approaching air current. This is not the view, apparently, which is favored by the Bureau of Mines. George S. Rice leans at present to the opinion that the relative dampness of intake and return airways determines the direction of the explosive action. M. Taffanel gives no approval to any of the proposed determining factors. While not desiring to elaborate on the question, I favor the view that the direction of the air current is the main determinant of the direction of action of the explosion and that the chemical constituents of the air and the condition of the airways are but secondary considerations.

F. A. BOAG.

Indianapolis, Ind.

What Constitutes a Good Air Current?

I note in the first issue, the reference of Francis N. Goff to the fact that "Advocates of unsplit air-currents are influenced too much by the brisk breezes of air, which are used in continuous current mines." The statement is justified, I think, by the experience of many mine managers.

I recall a superintendent of long experience who related with gusto, a story illustrative of the tendency to judge the strength and gage the value of an air current merely by its "feel," if I may so express it. Some of his men were loafing in a bar room and overheard the conversation of an Irish miner, who was busily discussing the superintendent's

many demerits and incapacities. Among other things he said:

"Oi had driv' a bit br—reast forninst a counter. The owld man come aroun' an towld me to make a bit ov a hole to pass the air through the pillar. I druv' the hole and the dr—raft was that bad it 'ud blow the cap aff yer head. The owld man kep' a comin' in, and tellin' me to 'Widen 'er out!' When Oi had it six fate wide and coal high, he towld me 'Alright,' but divil-a-bit of air was goin' through. You couldn't see it on your light at all, and he call himself a minin' boss."

J. G. TIMPSON.

New York City.

Burns from Firedamp

Some time ago at No. 7 pit, Netherton colliery, Dudley, in England, an explosion occurred, in which five men received injuries. Two of these men died later, and at the customary inquiry into the cause of death, a new and possibly important medical theory was advanced by Doctor Paddom, senior house surgeon at the Guest hospital.

The names of the deceased miners were White and Ball, and the doctor said White would not, in all probability, have died from the effects of the burns if he had not had a serious illness before the accident, which rendered him a weakling. Ball, however, was a strong man, and in his case there was no scorching of the hair or charring of the flesh. There were simply large burns, due to great heat. Ball and White had sufficiently recovered from the burns to have some of their dressings removed, and they were considered to have passed the dangerous stage, so far as shock was concerned. In neither case was a fatal issue expected.

These were the circumstances, and Doctor Paddom gave it as his opinion, and also that of a medical man of far greater experience than himself, that there was something more than the severity of the burns to account for death.

Naturally, underground life might lower the powers of resistance of miners as a class, so that they have not the reserve fund of strength of men living in the open air; but the doctor was not justified in stating that this possibility might have operated in accelerating the death of Ball. In both cases there was evidence of the men being adversely affected by something more than their burns, and Doctor Paddom believed there was, at least in the nature of the explosion, something poisonous, which acted adversely to their chances of recovery. The doctor certainly did not expect a strong man to perish so long after the burns were inflicted, and while unable to say whether it was possible for the poisoning to have been caused by firedamp, he certainly thought a toxicologist should make investigations in Ball's case. The

jury in returning the verdict added a rider, adopting the latter suggestion.

R. L. LAWRENCE.

Bristol, England.

[Our correspondent unfortunately neglected to give sufficient details to make the matter clear. There are a number of causes to which death under these conditions might be attributed: Gas poisoning, as suggested, the gas being carbon monoxide, resulting from combustion of the firedamp; second, shock which may be likened to heart failure, and third, the inhalation of flame. We would like to hear from any reader who may know of such a delayed death from a like accident. A statement of the causes to which death was attributed would be valuable.—EDITOR.]

Advocating Reduced Splitting

The effect of heated and moist air on human endurance is more marked than that of air containing 3 or 4 per cent. of carbon dioxide, even when produced by human exhalations and containing all their foul products. Leonard Hill has repeated the well known experiment by Doctor Haldane, of shutting men in an air-tight chamber. They experienced no distress so long as the heat and moisture were kept normal and the air moving.

I would like to call your attention to the bearing of this fact on the splitting of air, which was discussed in your first issue. A slow air-current in the mines always means excess warmth and a lack of due evaporation from the human body and is, therefore, to be condemned.

Hill even recommended, at the September meeting of the British Association, the use of stirring-up fans in submarine tunnel work, suggesting that it would agitate the inclosed air in a place where it was difficult to provide sufficient ventilation from outside owing to the extremely high pressures at which the work had to be conducted.

He stated, quoting the *Colliery Guardian*, "that the warm moist atmosphere brought much blood into the skin and depleted the viscera which perfected the blood and robbed the brain of ample flow." The human body demands air movement and it is also necessary to produce the proper admixture of gases in the mines; diffusion failing to produce that admixture adequately.

G. E. ALGERNON.

Chicago, Ill.

If all hoisting drums were surrounded by good stout railings many accidents might be prevented. If thin board partitions with canvas tops reaching to the rafters of the hoisting room are placed between the hoisting drum and the engineer, the particles of dust given off by the hoisting ropes cannot find a lodgment in the engineer's eyes and the danger of overwinding will be greatly reduced.

INQUIRIES of GENERAL INTEREST

A Page Devoted to Those who want Information. All Questions must be Accompanied by the Name and Address of Inquirer

Inspection of Yellow Pine

I am receiving a large quantity of yellow-pine lumber for construction work and find the requisitions call for "merchantable inspection." Will you please tell me exactly what this means?

FOREMAN.

The 1905 rules of the North Carolina Pine Association, Inc., which are generally adopted, and in use, read as follows in regard to merchantable inspection. All sizes under 9 in. shall show some heart for the entire length on one side. All sizes 9 in. and over, shall show some heart for the entire length on two opposite sides. Wane may be allowed to cover one-eighth of the width of the piece, measured across the face of the wane, and extending one-fourth of the length of the piece on one corner, or its equivalent on two or more corners; provided, that not over 10 per cent. of the pieces of any one size shall show such wane.

"Heart" means wood from the heart of the tree; it contains the least amount of resin or sap in the pores and is stronger and more durable than sap wood. "Wane" means bark, or lack of wood for any reason, on the corners of the timber.

Energy Lost on Climbing Grade

If a trip, which will just run by gravity on a grade of 1.5 per cent. be landed at the head of a plane at 10 miles per hour on to an up-grade of 0.5 per cent., how far will the trip travel? R. F. B.

The resistance the trip would make on an even grade to motion would be $1\frac{1}{2}$ per cent. of its weight. On a 0.5 per cent. up-grade it would require a pull $= 1\frac{1}{2} + \frac{1}{2} = 2$ per cent. of its weight. Hence the force acting against the trip of which the weight is $W = W \times 0.02$. The energy this force would exert in a distance of s ft. would be $W \times 0.02 \times s$. The cars would lose this energy, continuing to run until it was all expended.

A speed of 10 miles an hour $= \frac{10 \times 5280}{60 \times 60} = \frac{44}{3}$ ft. per sec. The stored energy in the cars $= \frac{1}{2} \text{ mass} \times \text{velocity squared}$.

$$\text{Mass} = \frac{\text{weight}}{32.2} = \frac{W}{32.2}$$

Therefore,

$$\text{Stored energy} = \frac{1}{2} \times \frac{W}{32.2} \times \left(\frac{44}{3}\right)^2 = W \times 3.34.$$

But the energy lost by the cars equals the stored energy when the trip is stalled. Hence,

$$W \times 0.02 \times s = 3.34 W.$$

Canceling W ,

$$s = \frac{3.34}{0.02} = 167 \text{ ft.}$$

The cars would run 167 ft. at which time all the stored energy would be expended.

An Inside Pumping Problem

I have a shaft mine with workings in two seams. At present the water from the upper seam runs to a large pump in the lower vein, but I want to send it from the upper vein directly to the surface. The lift will be 225 ft. and I find that a sump about 10x10x8 ft. fills in 12 min. What size pump will I require? R. P. K.

A sump 10x10x8 ft. holds 800 cu.ft., and since it fills in 12 min., there is an inflow of $\frac{800}{12} = 66\frac{2}{3}$ cu.ft. per min. For convenience and an added element of safety, it will be assumed that the inflow per minute is 75 cu.ft.

To determine the required size of pump let:

A = Area in sq.in. of water piston or plunger.

D = Diameter in inches of water piston or plunger.

A_1 = Area in sq.in. of steam piston.

D_1 = Diameter in inches of steam piston.

S = Piston speed in ft. per min.

P = Water pressure in lb. per sq.in.

P_1 = Steam pressure in pounds per sq.in.

The piston speed S , that is, the number of feet that the piston travels back and forth in a minute is usually taken to be 100 ft. per min., for medium-sized pumps. Using this value, the amount theoretically discharged by the pump piston each minute is,

$$100 \times \frac{A}{144} \text{ cu.ft.,}$$

as a matter of fact, however, the actual discharge will usually be about $\frac{3}{4}$ of that amount because some water always slips past the piston and valves or otherwise leaks. Thus placing $\frac{3}{4} \times \frac{100A}{144}$, equal

to 75 cu.ft. (the required amount), enables the value of A to be determined as follows:

$$\frac{3 \times 100 \times A}{4 \times 144} = 75,$$

$$A = 144 \text{ sq.in.,}$$

and the diameter

$$D = \sqrt{\frac{A}{0.7854}} = 13\frac{1}{2} \text{ in.}$$

The height of the column of water against which this pump has to work is 225 ft. + 10 ft. = 235 ft., 10 ft. being the probable height of lift in the suction pipe should the sump run nearly dry.

The pressure resisting the motion of the pump piston is, therefore, theoretically $235 \times 0.433 = 101.75$ lb. per square inch where 0.433 lb. is the weight of a column of water 1 in. square and 1 ft. high. Friction in the pipes and at the valves, however, will probably increase this amount by 20 per cent. so that 125 lb. per sq.in. may reasonably be taken for the pressure.

The steam pressure carried at the boiler house will, lacking definite information, be assumed to be 100 lb. per sq.in. Probably 80 lb. per sq.in. is all that can be expected down at the pump and although small and medium-sized pumps do not as a rule use steam expansively, an average or mean effective pressure in the cylinder of 60 lb. per sq. in. is all that can safely be counted on. The total pressure against the steam piston has to balance the total pressure against the water piston, overcome the mechanical friction of the pump and also provide a surplus for starting up under load.

A fair allowance for the last two items is 20 per cent. of the whole. Then of the total pressure $A_1 P_1$ exerted against the steam piston $\frac{8}{10} A_1 P_1$ is the portion which can be relied on to balance the water column. Therefore, $\frac{8}{10} A_1 P_1 = A P$ and substituting the values of P , P_1 and A

$$\frac{8 \times A_1 \times 60}{10} = 125 \times 144,$$

from which $A_1 = 375$ sq.in. and

$$D_1 = \sqrt{\frac{A_1}{0.7854}} = 22 \text{ in.}$$

These figures would indicate a simple double-acting pump having a 22-in. diameter steam cylinder and a 14-in. diameter water piston or plunger. The length of stroke would be determined by the design and proportions of the pump in accordance with manufacturing standards;

it would probably be between 14 and 18 in. but within certain limits the exact value is immaterial.

A pump of this type and size, 22x14x18 in., is, however, rather unwieldy and also likely to be wasteful of steam. A duplex pump, consisting of two smaller single pumps would undoubtedly give better results, in economy, regularity of flow, and facility in starting up.

To determine the size of such a pump, it is only necessary to find the diameter of two water and two steam pistons, the combined area of which will be equal, respectively, to the water and the steam pistons of the simple pump. Let d be the diameter of the water piston and d_1 of the steam pistons, then

$$d = \sqrt{\frac{A}{2} \div 0.7854} \text{ and } d_1 = \sqrt{\frac{A_1}{2} \div 0.7854}$$

or $d = 9\frac{1}{2}$ in. and $d_1 = 15\frac{1}{2}$ in. These figures indicate a duplex pump having 16 in. diam. steam cylinders and 10-in. diam. water pistons or plungers. As before, the exact value of the stroke is immaterial but would probably be about 12 inches.

The cost of briquetting in France, is placed at from 24 to 40c. per ton; in Germany, from 22 to 24c. per ton; in England, it is stated to be 24c. per ton. The Bureau of Mines gives the following estimate of the cost of manufacturing briquets in this country.

	Western States	Eastern States
Labor, including stacking...	\$0.16	\$0.20
Oil and grease.....	0.006	0.01
Sundry stores.....	0.01	0.01
Steam (fuel).....	0.04	0.17
Depreciation.....	0.05	0.10
	\$0.266	\$0.49

Indications of Fracture

How can you tell where a bone is fractured?

FIRST-AID STUDENT.

It is not always easy to tell that there is a fracture of a bone. But it is important to know, so that the fracture may not be followed by a cutting of the flesh while handling the patient. The indications are as follows: 1. The patient feels pain at that particular point and the point hurts when touched. But this is true of other forms of injury. 2. The broken ends of the bone may be felt. 3. The significant "crepitus" or rubbing of one part against the other may be heard. 4. The part may be altered in shape or shortened. 5. There may be unusual movement at the place where fracture occurs. The muscles acting on the bones under natural conditions are like ropes acting on a steel or wood structure. They cannot control the part of the body where a fracture has taken place, because the stiff part on which they act has collapsed. 6. Some inequality may be felt as you run your finger along the skin covering the broken bone. This will be more apparent soon after fracture, because swell-

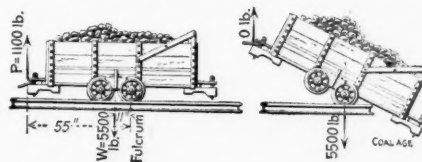
ing does not immediately arise to disguise it.

Rock Dumping with Gallows Dump

A car weighing 1500 lb. is loaded with 4000 lb. of rock, in a symmetrical manner, so that the vertical through the center of gravity falls midway between the axles when the car is level. The axles on the car are 22 in. apart between centers and the distance from the center line of the front axle to the point of attachment of the hook at the rear of the car is 4 ft. 7 in. It is proposed to tilt the car by pulling upward on the rear end of the draw bar by a chain maintained in a vertical line. What must be the pull on the tilting chain?

B. M. C.

The fulcrum or revolving center, on which the car is tilted, is the axle of the front wheels. The lifting force (P lb.) is situated 4 ft. 7 in. or 55 in. from that axle. The moment or leverage of $P = P \times 55$ expressed in inch-pounds.



UNLOADING A CAR OF ROCK

The weight of the car is 5500 lb., and its moment or leverage is $5500 \times$ half the distance between the axles, or 5500×11 in inch-pounds.

These leverages are equal when the car is about to move; that is, $P \times 55 = 5500 \times 11$, wherefore $P = 1100$ lb. It will be necessary for a lift of a little over 1100 lb. to be induced in the tilting chain in order that the car may be lifted.

The second figure illustrating this answer shows that by reason of the fulcrum, the load and point of attachment of the chain not being in one straight line, a little tilting of the car makes a great change in the lift required, even without any accompanying spilling of rock through the door or over it. The center of gravity of the car is high, and a tilt of 25 deg. in this case has made the load line, dropped from the center of gravity of the car, pass through the front axle, so that it no longer has any moment or leverage. It is not necessary under these conditions for the lift to have any moment and so P can be made zero. The car is balanced.

Example—In a similar case to the above, let the wheel base be 18 in. and the distance from the front axle to the rear hook 4 ft. 6 in. If the car weighs 5400 lb., what pull on the chain attached to the draw bar will upend the car?

Answer—900 pounds.

Grade on Rock Dump

We have been having trouble with our rock dump. We have read somewhere that the best grade for a road was 1.5 per cent. That is the grade we put in and now we find that occasionally the cars run without pushing toward the dump and are quite hard to push back; what grade should we have installed?

As the cars just run without pushing at 1.5 per cent., that shows that the resistance of the car to motion is 1.5 per cent. of its weight. Let us suppose your car weighs 1500 lb. and is loaded with 8000 lb. of rock. Then the resistance of the loaded car to motion, as it approaches the dump, which is the same as the frictional resistance on a level, is 9500×0.015 lb. = 142.5 lb. The gradient being x ft. per foot, the gravity impulse urging the car forward is $9500 \times x$. Therefore, the push demanded from the rock dumper must be the difference between the resistance of the car to motion and the gravity impulse helping it forward = $142.5 - 9500 \times x$ pounds.

On returning the empty car the frictional resistance to motion = $1500 \times 0.015 = 22.5$ lb. The resistance afforded by the car against its rising on the up-grade = $1500 \times x$. The rock dumper has to combat both these resistances or give a push = $22.5 + 1500 x$.

Assuming that he can push in both directions with equal facility, the impulse will be the same in each direction.

That is,

$$\begin{aligned} 22.5 + 1500 x &= 142.5 - 9500 x \\ 1500 x + 9500 x &= 142.5 - 22.5 \\ 11,000 x &= 120 \\ x &= 0.010909 \end{aligned}$$

The grade should be 1.0909 per cent., say 1.1 per cent. instead of 1.5 per cent.

Heating Value of a Briquet

What advantage results from briquetting a coal that has a low heat value?

L. B. F.

The heating value of a briquet equals the heat units of the coal used plus the heat units contained in the binder. The heat value of organic binders is as great or greater than that of the coal used, hence they add slightly to the heating value of the briquet. Briquetting slack that is not especially high in heating value, permits a more complete combustion, and causes the coal to yield, weight for weight, an increased heating value. Anthracite slack is successfully briquetted in several localities.

If briquets crack in the process of manufacture the chances are that the right proportion of binder is not being used, the mixing is imperfect, or the compression is either insufficient or applied while the mixture is too wet.

COAL and COKE NEWS

Editorial Correspondence from our own Representatives in Various Important Mining Centers, and a Record of Legislative and Other Action Affecting the Coal Industry

Washington, D. C.

Chairman Graham, of the House committee which is investigating the Alaska coal-land situation, will return to Washington within a few days and the investigating committee will be reconvened almost immediately. Hearings will be resumed at once and it is expected that Secretary Fisher and Director Holmes, of the Bureau of Mines, will be summoned before the organization. They will be asked to state what they learned during their visit to Alaska during the past summer. At the same time it is probable that Gifford Pinchot, who has also recently returned from an Alaskan visit, will appear before the committee.

Secretary Stimson, of the War Department, has issued a statement declaring his acceptance of the Taylor system of shop management and giving the results of an experimental use of the system at the Watertown arsenal. The Secretary's indorsement of the system is accompanied by what amounts to an agreement to put it into operation in other arsenals and at other Government works under the direction of the War Department. This has called forth strong protests from labor representatives and it is now stated that these representatives will resume their attack on the system before the House committee on labor, making it if anything more severe than heretofore. Some leading labor representatives have already expressed themselves; and at sessions which are to be held about the time of the reopening of Congress, others will present evidence. The committee is expected to report against the Taylor system. Thus a sharp issue may be joined between the administration and the labor interests.

PETITION TO DISSOLVE THE STEEL TRUST

Attorney General Wickersham, Oct. 26, filed a petition for the dissolution of the so called steel trust. The petition describes the processes by which the United States Steel Corporation was built up, reviewing much of the ground covered in the Bureau of Corporations' report but giving comparatively little attention to the coal lands acquired during the early history of the concern. In discussing the later developments more attention is given to coal, and special stress is placed upon the fact that the present position of the corporation has been secured through the ownership or control of coal, coke, iron-ore and transportation properties.

In speaking of the Tennessee Coal and

Iron deal the petition says that "by this purchase the corporation acquired 447,443 acres of mineral lands in Tennessee, Georgia and Alabama, containing approximately 400,000,000 tons of merchantable ore and 1,200,000,000 tons of coal, of which over one-third is coking coal. The Tennessee properties embraced 18 developed and active iron-ore mines and 23 coal mines, 16 blast furnaces, the ownership of several land companies holding extensive tracts of lands, and the Birmingham Southern Railroad Company, a terminal property of great value connecting the various mines and plants in the Birmingham district with all the diverging trunk lines."

Later in speaking of the general position of the Steel Corporation, the petition says: "At its organization, it controlled the bulk of the best coking-coal lands in the Connellsville region and so acquired a great advantage over its competitors. In 1911, it made an important acquisition of coking-coal properties from the Pittsburg Coal Company. The control acquired of coking and other coal through the Tennessee company has added vastly to the strength of its position through absorption of raw material, thus locking it up and withdrawing it from the market, as an acquirement by its possible competitors."

Alabama

Birmingham—Announcement is made of the appointment of a protective committee, representing holders of the preferred stock of the Alabama Consolidated Coal and Iron Company who are dissatisfied with the proposed distribution of securities under the plan for the \$30,000,000 merger with the Southern Iron and Steel Company.

California

San Francisco—The Pacific Coast Coal Company has concluded to retire from the California market, and has disposed of all its stock and transferred its interests to the Western Fuel Company.

The acquisition of the California business of the Pacific Coast Coal Company gives the Western Fuel Company control of all the existing bunker and lighterage facilities in the harbor of San Francisco.

Colorado

Denver—A temporary injunction has been granted by Federal Judge R. E. Lewis, prohibiting the Routt County Fuel

Company from mining coal under 320 acres of land near Oak Creek. The injunction is also directed against the Union Land Company and the Continental Trust Company. Judge Lewis' decision is a victory for the Government in its campaign to prevent the alleged unlawful acquiring of valuable coal lands in Routt county.

Illinois

Mt. Vernon—Loren N. Wood has disposed of 7000 acres of Jefferson county coal lands to the Big Muddy Coal Company of New York. The purchase price has not been announced but is said to be more than \$250,000.

Ottawa—A mortgage for the sum of \$700,000 was filed in the recorder's office recently by the Chicago, Wilmington & Vermillion Coal Company. This large sum is for the purpose of purchasing 6000 acres of land in Franklin county, and developing it in the mining industry.

The St. Paul Coal Company has changed the location of its office from Chicago to Ottawa.

Indiana

Evansville—Two shot-firers were killed in an explosion resulting from a "windy" shot in the second level of the Ft. Branch Mining Company's shaft at Ft. Branch in the afternoon of Nov. 4, shortly after the miners had left the mine.

The United States rescue car from Evansville was soon on the ground, but because of the fall of timbers and debris that blocked the way the two bodies were not recovered until midnight.

Kansas

Pittsburg—The Hamilton Coal Company and the Girard Fuel Company have connected their main shafts and air shafts and are now working regularly.

Minden—The J. J. Pullen Coal Company, whose mine tibble was burned some time ago, will start to rebuild at once, having made a satisfactory settlement with the insurance company. As the mine is badly filled with water, it will in all probability not be ready for operation before Jan. 1.

Kentucky

Barbourville—The Martins Fork Company has bought a right of way from the main line of the Black Mountain & Wasioto railroad to the site of the mining

plant, near Harlan. Surveying on the spur line is now being done and the work of putting in the track will be started as soon as practicable.

Lexington—The Cambria Coal and Lumber Company filed articles of incorporation here recently. The business of the new company is to be the buying, leasing and operating of coal, coke, timber, oil and mineral lands. The capital stock is fixed at \$500,000 and the principal office is to be in Lexington.

Missouri

St. Louis—It is reported that the Hawley-Erb syndicate has purchased the Novinger coalfields in Missouri. The same syndicate, it is said, will extend the Iowa Central to St. Louis, affording a through trunk line from Minneapolis and St. Paul to St. Louis, where connection will be made with the combination's Missouri, Kansas & Texas road to the gulf.

Maryville—More than 25,000 acres of land have been leased in Nodaway county in the last six weeks for coal- and oil-prospecting purposes. Work of drilling at various points in the county will begin within the next two weeks under the direction of R. W. Wallace, of St. Louis, who obtained the leases for an Eastern syndicate.

Ohio

Columbus—The Central Ohio Operators' association has filed complaint with the public service commission against the Baltimore & Ohio, Wheeling & Lake Erie and Pennsylvania railroads, charging that their rates on coal shipments are excessive, unjust and unreasonable. The association has a membership of operators in the Tuscarawas field.

Lore City—That portion of the Black Top mine of the Morris Coal Company which was on fire has been entirely sealed up and the burning portion thoroughly walled in. The mine has resumed operations.

Pennsylvania

BITUMINOUS

Altoona—The Pennsylvania Coal and Coke Corporation, it is reported, will become the owners of the land and other properties of the old Pennsylvania Coal and Coke Company now held by a committee of the bondholders. The Pennsylvania Coal and Coke company controlled about 100,000 acres of coal land in Blair and adjoining counties. Of this acreage about 50,000 is being operated. Only the active land is included in the pending deals.

At a meeting to be held in Philadelphia, Nov. 10, it is understood the reorganization will be formally effected, an issue of stock authorized and a president and board of directors chosen.

The case of the Walnut Coal Company,

a local corporation, against the Pennsylvania Railroad company for alleged discrimination in furnishing coal cars was recently brought to an end at Clearfield. The coal operators were awarded a verdict of \$78,468, one of the largest awards ever given in a case of this character.

Uniontown—The H. C. Frick Coke company has fired 525 new coke ovens in the Uniontown and the Connellsville regions, making a total of 645 new ovens lighted last week. Placing in commission of these new ovens means the employment of about 1100 additional men.

ANTHRACITE

Wilkes-Barre—Eight dredges have been at work for the past six months in the Susquehanna river near Bloomsburg and it is estimated that 10,000 tons of buckwheat and rice coal have been dug up. It is said that about 4000 tons more has been secured this year from the river near Danville.

G. B. Markle and Company have recently imported a number of negro laborers for work in driving a rock tunnel across the Highland basin. They are mostly expert rock men and their presence should not be construed as indicative of the intention to introduce negro labor in this field.

Pottsville—The tri-district convention of the anthracite mine workers, held here Oct. 31 to Nov. 3, formulated the demands which it desires to have made a part of the next agreement with the operators. The national president was empowered to order a suspension if these demands are not granted at the termination of the present agreement. The three most important of the 10 items are:—1. Recognition of the union. 2. An eight-hour day. 3. A 20 per cent. increase in pay.

Tennessee

Knoxville—The Bon Jellico Coal Company has been incorporated for \$100,000. The purchase by this company of 1250 acres of virgin coal lands between Jellico and Williamsburg, Kentucky, is reported.

West Virginia

Wheeling—The sale of the coal lands and all properties of the Sleepy Mountain Anthracite Coal Company, of Morgan and Berkeley counties, to Hay Walker, Jr., for the sum of \$250,000, by special master in bankruptcy John C. Berry, was approved recently by Judge Dayton in the United States circuit court.

The Big Bluff Coal Company, of Huntington, has been incorporated to mine coal and manufacture coke and develop timber lands. The capital stock is \$400,000.

Canada

Alberta—The strike of the coal miners of eastern British Columbia and Alberta, which has been in progress for nearly

eight months, is at an end, and in the course of a few days it is expected that every one of the 25 mines in the district will be in operation, with 7500 men at work. The magnitude of the strike may be seen when it is stated that the mines represent an invested capital of \$40,000,000, while the monthly payroll of the men totals in the neighborhood of a million dollars.

It is understood that an open shop is conceded to the operators and a nondiscrimination clause inserted in the agreement similar to the one now on file with the Department of Labor at Ottawa, also, that a uniform scale of wages shall apply, applicable to all mines in the association, said scale to be the scale of the Western Coal Operators' Association of the last agreement, with an increased percentage added.

PERSONALS

M. S. Kemmerer, of Mauch Chunk, Penn., recently paid his annual visit to Kemmerer, Wyoming, where he has coal-mining interests. The town is named for him.

A. C. Leisenring, superintendent of the Upper Lehigh Coal Company, Upper Lehigh, Penn., has tendered his resignation to take effect Jan. 1. Mr. Leisenring has been connected with the anthracite industry for many years and now goes to assume management of a West Virginia Coal Company.

Announcements

The Book Department of the Engineering News Publishing Company, has been purchased by the McGraw-Hill Book Company, 239 West Thirtiyninth street, New York. This adds to the list of the McGraw-Hill Book Company, a considerable number of important standard treatises, primarily in the field of civil engineering. The transfer of this business was made on November 6, 1911.

The U. S. Civil Service Commission announces an examination to be held Nov. 25, to secure eligibles from which to make certification to fill a vacancy in the position of assistant mechanical engineer in the Bureau of Mines, at a salary of from \$2000 to \$2750 a year. The duties of the person appointed to this position will be to assist and participate in the investigations of mechanical-engineering subjects connected with the mining industry, especially along lines relating to haulage and hoisting equipment. The examination will consist of the subjects mentioned below, weighted as indicated: General education and technical training, 40 points; professional and technical experience and fitness, 40 points; publications and official reports, or thesis, 20 points. Applicants must have reached their 25th, but not their 40th birthday. Examination form 304 and special form.

COAL TRADE REVIEWS

Current Prices of Coal and Coke and Market Conditions in the Important Centers

General Review

The optimistic views for an active winter trade are being slowly realized, particularly in sections where the recent cold wave was in evidence. The market, generally, is showing a better tone, with prices firm or advancing.

On the Atlantic coast, shortage of water transportation has resulted in light shipments, in most instances considerably below that of last year. Demand continues firm, especially for the better grades, with producers and railroads in good position to handle a large tonnage which it is thought will be greater this November than last. The slackening of lake shipments from the Pittsburg district has thrown an excess on the market with the result that prices are irregular, and mines only working from 55 to 65 per cent. capacity.

Lake shipments from Buffalo are a quarter of a million tons ahead of this time last year, but local trade is light. Reports from middle East points fluctuate almost directly with the weather, but are generally good, although prices are inclined to be irregular.

As a result of the cold snap in the middle West, there has been a noticeable strengthening of this market. Supplies are reported adequate, and the usual increase in prices is now effective in most sections, which is tending to retard buying.

In the Rocky Mountain States, trade continues active and there is a noticeable improvement in transportation facilities. On the Pacific coast, mild weather prevails and trade is therefore light, with slow rail shipments in the south due to the strike on the Harriman lines.

Boston, Mass.

The bituminous market is beginning to show signs of the advancing season. The colder weather has not been with us long enough to have any very marked effect on prices, but most of the larger shippers of standard Pocahontas and New River coals have advanced to \$2.60, f.o.b. vessel at Hampton Roads.

There would soon be demand for Pennsylvania soft coals but for the fact that to get any advantage in freights their shippers would have to rely on Reading transportation, and the barges of that fleet are committed way ahead on anthracite requirements. The Somerset County coals are supposed to be on the basis of \$1.20 at the mines now, instead of the

\$1.10 and \$1.15 that obtained a week ago.

All-rail bituminous is practically unchanged. There is only a fair volume of coal moving, almost altogether on contract, and prices are still at low figures.

Reference to the following table will show the extent to which, on Oct. 1, the slow movement of transportation had affected the receipts of coal at the port of Boston, the figures being confined to domestic coal:

Anthracite receipts, September, 1911.....	125,436 tons
Anthracite receipts, September, 1910.....	153,516
Shortage, as against 1910.....	28,080
Anthracite receipts, 9 months ending September 30, 1911.....	1,358,925
Anthracite receipts, 9 months ending September 30, 1910....	1,273,344
Excess, over same period, 1910.....	85,581
Bituminous receipts, September, 1911.....	316,039
Bituminous receipts, September, 1910.....	362,802
Shortage, as against 1910.....	46,763
Bituminous receipts, 9 months ending September 30, 1911.....	3,024,578
Bituminous receipts, same period, 1910.....	2,982,785
Excess, over 1910.....	41,793

In other words, while the total tonnage, in both anthracite and bituminous, in the nine months from Jan. 1, was considerably in excess of the receipts for the same months in 1910, yet the tonnage for the month of September was materially behind that of last year. October will show tonnages still further in arrears.

New York

Although the standing tonnage at the New York piers is somewhat above normal, the demand on contract is so good that standard-grade steam coals are moving from the piers with fairly prompt despatch and there is no unwieldy accumulation of these grades at tidewater. Inferior steam coals, however, still continue to be a drug on the market and shippers of this class of coal ought to realize that it is very poor policy to over-ship this market under present conditions.

There has been a little spot business in the market this week but the amount of the tonnage has not been large. The car supply in the regions shipping this market is reported satisfactory and mines have accordingly been in a position to work full time when required, although two church holidays last week had a tendency to decrease production. Railroad movement at New York tidewater is

prompt, which is an aid to those producers who have heavily contracted, in the taking care of their obligations.

Demurrage coals, which are in practically every instance low-grade steam coals, are being offered at sacrifice prices. Quotations on other steam coals range about as previously reported, \$2.35, f.o.b. for West Virginias (80c. at the mines); \$2.35@2.45 for ordinary Pennsylvanias; \$2.25@2.65 for good Pennsylvanias; and better-grade Pennsylvanias, \$2.65@2.75.

Philadelphia

Temperature has not been a very potent factor in the coal trade during the last week, or even during the past month. The demand seemed to be altogether spontaneous, as if the householders had put off purchasing until the last minute, and then all wanted their coal at once. October was inaugurated with an unusual activity in the coal trade, which simmered down to a fairly active trade during the closing days.

The wholesale market has its work cut out for this month, if it is to show an advance over last year's business. November has started in auspiciously, as the reports already show very substantial increases over last year, and any kind of weather should enhance this, but the tonnage last year for this period was very good, and it will take some good cold weather to enable the market to keep up to the record already set. Line trade is reported fairly active, while the tidewater business is very good, orders being in excess of the ability of the companies to supply. Prices at tidewater: Broken, \$4.50; egg and stove, \$4.75; chestnut, \$5. Line prices \$3.75 for egg and stove, chestnut, \$4; pea, \$2, at the mines.

Pittsburg

Bituminous—Very little more coal will be taken up the Lakes this month, and none at all next month, the Lake insurance expiring Dec. 1. Besides the congestion at upper Lake points acting as a brake on the movement, Lake tonnage is difficult to secure as there is practically no possibility of vessels obtaining return cargoes of ore, and in many cases Lake vessels are being used for coal storage during the winter, being already loaded for their first trip in the spring.

Prices have become somewhat more irregular in consequence, and slack, which normally firms up at this juncture on account of greatly decreased production, is

no stronger than it was. We repeat former quotations, although they are probably being shaded somewhat more frequently than before: Nut, \$1@1.05; mine-run, \$1.05@1.10; 3/4-in., \$1.15@1.20; 1 1/4-in., \$1.25@1.30; slack, 40@50c., per ton at mine, Pittsburg district.

Connellsville Coke—The market is devoid of important developments. Demand for spot coke, both furnace and foundry, is very light, but prices being already down to bed rock, the majority of merchant producers have not suffered. Consumption is unchanged, but is fully covered by existing contracts. More than one-half the total production of the Connellsville and Lower Connellsville region is by interests which are themselves consumers. Of the remainder, or merchant production, more than one-half is covered by contracts which will extend into next year, a few being twelve-month contracts running to July 1, 1912, but the major part are longer-term contracts either at a fixed price or at a ratio to the average prevailing price of pig iron. Thus while some important contracts will have to be made for the half year or year the tonnage involved will be a relatively small percentage of the total output. No serious negotiations have yet been undertaken and as there is an ample surplus of capacity, business may not be closed for 30 or 60 days yet. We continue to quote: Prompt furnace, \$1.50@1.55; contract furnace (nominal), \$1.65@1.75; prompt foundry, \$1.80@1.90; contract foundry, \$2@2.25.

The *Courier* reports production in the Connellsville and Lower Connellsville region in the week ending Oct. 28 at 320,301 tons, an increase of 10,000 tons, and shipments at 3947 cars to Pittsburg, 5028 cars to points west and 952 cars to points east, a total of 9927 cars, an increase of 164 cars.

Buffalo, N. Y.

There is still a slight increase in the movement of soft coal, and conditions are satisfactory with the exception of prices, which do not promise to improve much, for the operators are so situated and so minded that they will increase the output in direct proportion as the demand increases. So long as this condition exists there can be no rise in prices, unless something unusual happens to curtail the production.

There is some falling off in the trade just now because of election, but the general quiet state of business is accountable for most of the change in that direction.

Soft-coal prices are unchanged at \$2.50 for Pittsburg three-quarter, \$2.40 for mine-run and \$2 for slack, with Allegheny Valley coal from 15 to 25c. lower. Slack is still quite unsteady and needs cold weather to give it proper firmness. The coke trade is still dull, with prices on the basis of \$4 for Connellsville foundry

and \$3.50 for stock coke. There is quite an amount of smithing coal sold here on the basis of \$4 for Georges Creek Cumberland, but dealers find that most consumers buy Cambria county smithing or washed slack, which sells all the way down to 50c. less.

Cleveland, Ohio

The Lake coal trade, with the exception of three or four concerns who are handling their own coal direct, is practically closed for the season. Considerable coal still remains on track and is now being loaded as quickly as possible in boats for storage during the winter months.

The domestic trade at this season should be much better than it is, but owing to the very mild weather during the month of October and up to the present date, the domestic demand has been very small.

There does not seem to be any improvement in the domestic trade or steam trade in the past week, excepting slack, which has advanced from 10 to 15c. The following are current prices per short ton here:

Ohio No. 8

Mine-run.....	\$0.95@1.00
3-in.....	1.05@1.10
1 1/4-in.....	1.15@1.25
Slack.....	0.50@0.60

Middle District:

Mine-run.....	\$1.00@1.10
3-in.....	1.20@1.30
1 1/4-in.....	1.45@1.60

Youghiogheny:

Mine-run.....	\$1.10@1.20
3-in.....	1.30@1.35
1 1/4-in.....	1.40@1.50

Pocahontas:

Mine-run.....	\$1.00@1.10
Lump.....	2.10@2.25

Columbus, Ohio

One of the best phases of the business is the demand for immediate shipment. For a time domestic business was fairly brisk in orders for future shipment but the cold spell caused a rush of orders for immediate delivery. Prices are ruling strong in every grade and there is no complaint of price cutting in any section. The general tone of the market is better and the prospects for the future believed to be satisfactory.

The lake trade in all districts of Ohio continues active in every respect and the Toledo docks of the Hocking Valley railroad have been busy recently, loading boats for the Northwest. During the week ending November 4, 56,000 tons were handled by the Toledo docks while the previous week the record was 71,000 tons. Since the opening of navigation the tonnage handled at the Toledo docks has been 2,225,000.

Production in various Ohio fields has been slightly above that of the past few weeks. In the domestic fields such as Jackson and Pomeroy Bend the output is about 85 per cent. of the average and

in the Hocking valley the output is about 80 per cent. In eastern Ohio the output ranges between 70 and 80 per cent. of the average. In other fields there is a slight increase in the production due to the better conditions of the trade.

The retail trade is on the increase. The cold wave has caused a rush of orders and dealers are busy taking care of deliveries. There is a good demand for the fancy grades of coal, particularly the splints and especially prepared varieties. Stocks in the hands of the dealers have been quite short and this means a rush of orders to the operator and wholesaler. Farmers are also buying much better since they have their work in hand better. Retail prices are strong but have not yet reached the winter level.

The fine coal market is slightly improved and prices show more firmness. The supply is still large and there are many cars in storage. Nut, pea and slack are selling at between 40 and 50c. and coarse slack between 35 and 40c.

Prevailing prices are as follows:

Hocking Valley:

Domestic lump.....	\$1.50
3/4-in.....	1.35
Mine-run.....	1.10

Eastern Ohio:

Domestic lump.....	1.65
Nut.....	1.15
Nut, pea and slack.....	0.45
Coarse slack.....	0.40

Cincinnati, Ohio

This is distinctly a weather market, with demand slightly better, as to both steam and domestic fuel, although, of course, the former is dependent upon general industrial conditions, which have not changed sufficiently—either for better or worse—to make a noticeable difference in the steam demand. The weather has been favorable for domestic demand. The temperature was considerably below freezing several nights last week in this immediate market and north of here the weather has been more severe.

Coal men never rejoice at anyone's misfortune, but they are human—at least the Cincinnati ones are. Consequently when, Friday of last week—all day and evening—a break in the gas main in West Virginia practically cut off the city's entire supply of gas there were lots of "I told you so" from coal men when they had time to say it between filling rush orders for fuel demanded by former customers who had been induced to substitute gas. Several business concerns in the city were forced to practically shut down and in one city institution at least—the city hospital—there was decided inconvenience.

Charleston, W. Va.

With the lake shipments practically at an end for this season, shipments are not now as heavy as they were. Some coal is still going to the lakes, but the re-

duction in the amount is not balanced by the increase for winter consumption, and, therefore, it is contended that at present there is a decrease rather than an increase in shipments. There has, however, been an increase in shipments other than to lake points.

No change in prices is reported. Instances are cited where a slight increase has been secured, but others are also noted where new contracts have been closed for less than the old ones. As a general rule coal men are not inclined to change their views heretofore expressed, that the future is none too bright for their interests and that little increase in the price of coal can be expected for another year or year and one-half.

Indianapolis

The retail coal trade which now occupies the center of the stage as regards distribution of domestic coal has been greatly stimulated by colder weather over a wide area of country. In fact, reports regarding this branch of the coal business show a healthier tone than they have for many months.

The usual annual increase in the price of coal became effective in Indiana, Nov. 1. Consumers are now paying from 25 to 50c. a ton more than previous to that date. The local dealers say it is due to the advance in wholesale prices. No advance, however, has been made on Indiana coal at the mines. Present prices are said to be the same as at this time last year and the advance on eastern coal was wholly expected.

Chicago

Weather, the car situation and quality of coal are the three dominant factors in the Chicago coal market at present. The recent drop in temperature brought brisk buying with the result that the wholesale and retail markets have been active. There has been a noticeable strengthening in the country districts, this being due to a limiting of the car supply for movements westward. The increase in country prices has ranged close to 25c. a ton.

Lump coal is not moving very rapidly in Chicago, and while some concerns are making an effort to maintain \$1.75, others are offering \$1.65, with differentials of 10c. below that figure on egg and nut. The result has been an increased demand for egg and nut and a weakening in the price on lump.

Prices direct from the mines in net tons to retail dealers and steam users on spot shipments are as follows:

Sullivan County:	Chicago	F.o.b. Mines
Domestic lump.....	\$2.35@2.45	\$1.50@1.60
Egg.....	2.25	1.40
Steam lump.....	2.10	1.25
Screenings.....	1.22@1.32	0.35@0.45
Springfield:		
Domestic lump.....	\$2.22@2.47	\$1.40@1.65
Steam lump.....	1.92@2.02	1.10@1.20
Mine-run.....	1.82@1.87	1.00@1.05
Screenings.....	1.22@1.32	0.40@0.50

Clinton:		
Domestic lump.....	\$2.17@2.37	\$1.40@1.60
Steam lump.....	2.00@2.20	1.25@1.45
Mine-run.....	1.82@2.02	1.05@1.25
Screenings.....	1.27@1.37	0.50@0.60

Pocahontas and New River:		
Mine-run.....	\$3.00@3.10	\$0.95@1.05
Lump and egg.....	4.05@4.30	2.00@2.25

Coke:		
Connellsville.....	\$4.50@4.65	
Wise county.....	4.50@4.65	
Byproduct, egg and stove.....		4.95
Byproduct, nut.....	4.55@4.65	
Gas house.....		4.85

Minneapolis—St. Paul

The expected turn for the better in the coal trade has happened, and the wintry blasts, with a slight fall of snow, should have credit for the change. After all is said, no one other influence stimulates the coal trade as generally as a continuous spell of cold weather.

The wholesale trade is showing a marked improvement. The buying has been slower than usual by the country dealer. They were stocked up as strong as they cared to be until the consumer showed some inclination to buy. The advance of winter has brought this about and now the dealer is reordering to fill up bins being depleted. What is known as the Line House trade have been liberal buyers within the past 10 days. These are the large retail-lumber companies and the elevator companies who are located with principal offices mainly in Minneapolis conducting a line of yards throughout the Northwestern States.

The steam market continues to be the discouraging feature of the trade. No change is looked for this year. There seems to be a rivalry between two or three dock companies and it looks like a fight for supremacy in this market. The larger companies are taking the lead in setting the price on steam trade and the jobber is practically out of it.

St. Louis, Mo.

Country demand for all kinds of coal is especially good and a large tonnage is moving through St. Louis to the Northern and Western market. The prevailing prices are:

STANDARD

6-in. lump.....	\$1.10@1.20
3-in. lump.....	1.10@1.15
2-in. lump.....	1.05@1.10

Mount Olive and Staunton District coals are still holding at about \$1.25@1.35 for domestic sizes. There is a good demand for the higher-grade coals from the inner district at from \$1.90@2.25. The above coals take a rate of 52c. to St. Louis.

FRANKLIN COUNTY

6-in. lump.....	\$1.60@1.75
3x6 egg.....	1.55@1.65
No. 1 nut.....	1.50@1.60
No. 2 nut.....	1.20@1.30

WILLIAMSON COUNTY

6-in. lump.....	\$1.50@1.60
3x6 egg.....	1.45@1.55
No. 1 nut.....	1.15@1.20
No. 2 nut.....	1.00@1.10
No. 3 nut.....	0.90
Mine-run.....	1.05
1/2-in. screenings.....	0.45

The above coals take a 67c. rate to St. Louis.

There is a good movement of Big Muddy coal from the Murphysboro field and some coal moving in from the Harrisburg district.

During the past week there has been a heavier tonnage of Springfield coal moving in than at any previous time this season. There has been a decided scarcity of anthracite chestnut, and it is very hard to get. The other sizes are moving freely, and a steady tonnage is coming forward at the regular circular.

Salt Lake City, Utah

Lack of equipment is the only thing which seems necessary to make this a banner year for the Utah mines. The demand is good, labor conditions satisfactory and weather so far ideal.

Generally speaking the mines have been doing better with their productions the past week. Colder weather has increased the demand, however, and they are still far behind with orders.

Special efforts are evidently being made by the Denver & Rio Grande in transporting coal and the result has been a very marked improvement in the service.

Prices on wholesale coal were boosted by Wyoming and Utah mines about the first of the month. Lump is now \$3; nut, \$2.50; run-of-mine, \$1.85, and slack, \$1, f.o.b. cars at Wyoming mines. Slightly lower at Utah mines.

Retail trade is splendid in Salt Lake and some of the smaller dealers who had not much coal stored are hard pressed for coal to fill orders.

Retail prices are still the same, that is, \$5.75 for lump; nut, \$5.50; slack, \$3.25 delivered.

Portland, Ore.

The coal market is dull locally, due to the fact that it is between seasons, the weather continuing mild. The summer storage supplies were removed Oct. 1, and the next change in values here will be an advance. How soon this will come depends altogether upon weather conditions. The fall weather has been ideal and hence few coal purchases have been made, those who buy for the month having no occasion to enter the market yet.

Little coal is coming in from Australia this season, and the railroad strike does not appear to have caused the Harriman lines any serious inconvenience in this section as yet. The country throughout appears prosperous, although some complaint is heard of dull business.

Following are the prices asked here per ton, including cost of delivery to points within the city proper:

Japanese.....	\$7.50
Washington lignite.....	\$7.00@7.50
Australian.....	10.00@10.50
Rock Springs, Wyo.....	10.00@10.50
Diamond, Wyo.....	10.00
Carbon Hill, Wash., lump.....	10.50
Carbon Hill, steam.....	7.50
Newcastle, Wash.....	7.00
Beaver Hill, Ore.....	9.00@9.25
Blacksmith coal.....	17.00